



Digitized by the Internet Archive
in 2016


~~~~~

THE

**JOURNAL**

OF

**THE ASIATIC SOCIETY**

OF

**BENGAL.**

—

**VOL. II.**

~~~~~


THE
JOURNAL
OF
THE ASIATIC SOCIETY
OF
BENGAL.



EDITED BY
JAMES PRINSEP, F. R. S.
SECRETARY OF THE ASIATIC SOCIETY.

VOL. II.

JANUARY TO DECEMBER,
1833.

"It will flourish, if naturalists, chemists, antiquaries, philologists, and men of science, in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta; it will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease."

SIR WM. JONES.

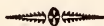
Calcutta :

PRINTED AT THE BAPTIST MISSION PRESS, CIRCULAR ROAD

SOLD BY MESSRS. THACKER AND CO. ST. ANDREW'S LIBRARY.

1833.

P R E F A C E.



ON completion of this second volume of the *JOURNAL OF THE ASIATIC SOCIETY*, the Editor feels it to be due to his subscribers, as well as to himself, to lay before them as briefly as possible, the results of the arrangements which he contemplated carrying into effect at the conclusion of the last volume;—more especially as a somewhat erroneous estimate of the cost and circulation of the *JOURNAL* found admission into a late notice of the Indian Periodical Press, drawn up by the Editor of one of the morning papers. The *JOURNAL* is not published, as there stated, by the Asiatic Society, but solely at the cost and responsibility of the Secretary, who was Editor of it before he enjoyed the honour of an election to that office. Since there never has been the least view to profit, either in the *GLEANINGS* or in the present work, there can be no object whatever in concealing any information respecting its publication; and it may be useful hereafter to find on record a note of the expenses of printing, and the difficulties against which a Journal exclusively scientific has had to contend, as well as the advantages which it has enjoyed, in India at the present time. The following particulars have therefore been extracted from the accounts of the two years now terminated.

The amount of subscriptions to the *JOURNAL* at one rupee per number, including two extra numbers, in 1832, was Rs. 5148 8

From this, deducting 20 per cent. commission paid to Messrs. Thacker and Co. for circulating it, 1028 11

There remained net subscriptions available, Rs. 4114 13

The Baptist Mission Press charged for printing and stitching 500 copies, Rs. 3742 10

And the 15 plates cost with printing, 416 5

Total 4178 5

The result of the first year exhibits a sufficient accordance between outlay and return. Of the amount subscribed however, only Rs. 3786 13 have been collected up to the present time, so that in fact there was a deficit of Rs. 392 2.

The alterations which the Editor proposed and completed for the second year were :—

1. The saving of nearly half of the commission paid for the mere circulation of the work (without responsibility), by undertaking that duty with the aid of his establishment as Secretary of the Asiatic Society;

2. As a return for this favor, he proposed circulating the Journal gratis to such of the paying members as should express a desire to take it in.

The effect of this scheme has been as follows :

Fifty members of the Society have availed themselves of the privilege, which has made a deduction to the same amount from the monthly receipts. The number of copies circulated, including those sent to subscribers and societies in Europe, is about 450.

The number of paying subscribers on the list, is 320, which at 1 R. per month, (including one extra number of Buchanan,) would give Rs. 4480.

The expenses of printing 500 copies, of 670 pages,

at 4-5 per page, may be stated at	Rs. 2,890
144 pages of Buchanan, at 4-8 per page,	648
Covers, table work, &c. charged extra,	250
40 pages of Appendix, at 5 Rs.	200
28 plates (18 lithographs, 10 engravings*),	480
Establishment for circulation,	600

— 5,068

Leaving a loss on the year of Rs. 588, or nearly as much as the subscriptions of the members exempted from paying.

But it must be mentioned, and mentioned with a degree of disappointment which is almost disheartening, that of the flattering list of sub-

* For these the cost of printing and paper only is charged.

scribers above given, 70 have not paid any part of the year's subscription, and as many more are still in arrears; so that a balance of Rs. 1321-8 still remains to be collected. The actual state of the concern is therefore by no means so favorable as could be wished, for it leaves the Editor out of pocket upwards of 2000 Rs. as the reward of his labour for two years ! But will not for a moment suppose that the balances outstanding are not recoverable : on the contrary the principal difficulty lies in the distance, and the supposed want of a mode of remittance.—Many subscribers are not aware, that letters containing *hoondees* for the amount may be transmitted *post free* to the Editor.

It will be remembered, that the Bengal Government were pleased to bestow the privilege of free postage on the *GLEANINGS* and on the *JOURNAL*, on condition of the publication of the late Dr. Buchanan's Statistical Reports. Under the impression (justly formed) of a corresponding increase of circulation, consequent upon this liberal boon, it was resolved not to incorporate these records in detached notices in the *JOURNAL*, nor to diminish from its original matter*, but to publish them as a separate work ; and one volume has accordingly been completed, containing 356 pages, which at 4-8 per page have cost Rs. 1,602

And a reprint of the first 108 pages, which became necessary on the subsequent extension of the edition from 300 to 500 copies,

	216
	1818
Total, Rs.	

This expence has been incurred therefore on account of Government, in return for the postage saved, not to the work, but to the subscribers of the *JOURNAL*. On the completion of the first volume of *BUCHANAN*, a second extra volume of an official nature on the Monetary System was commenced, of which 50 pages have been printed with 3 plates, being in fact an expence of more than 300 rupees not included in the above estimate. The Government meantime placed the remaining volumes of Buchanan in the Editor's hands, with an intimation of its "desire that the printing of these records should be continued." It was therefore with no small feeling of mortification that

* Originally 32 pages only were given in each number, latterly 64.

the EDITOR perused the following letter, announcing that the privilege of free postage should cease from June next, especially after having been honored, on an explanation of the nature of the work, with an extension of the same privilege to the Madras presidency, in addition to that formerly bestowed by the Governors of Bombay and Ceylon.

To JAMES PRINSEP, Esq.

Genl. Dept.
Sir,

Editor of the Journal of the Asiatic Society,

I am directed to inform you, that the Governor General in Council has resolved, that after six months the exemption from postage, which is now enjoyed by the Journal of the Asiatic Society, shall be discontinued.

I have the honor to be,

Sir,

Your most obedient servant,

Council Chamber,
2nd Dec. 1833.

G. A. BUSHBY,

Offg. Sec. to Govt.

It may reasonably be feared that many subscribers at distant stations may be unable to continue their support to the work, when its cost shall be enhanced by postage; but (should it be impossible, on a proper and respectful representation of the circumstances, to avert the imposition of postage) every means will be taken of lessening the burthen by sending the monthly numbers by the bangy instead of the regular dāk.

On the contents of a volume which has already been perused by nearly all to whom it circulates, it would have been obviously needless to make any remark, were it not desirable to prove that the favors hitherto conferred upon the work by the Government of the country had not been altogether misapplied.

Independently of the volume of Dinajpur Statistics, which forms a model for the use of public officers engaged in collecting similar information, the GLEANINGS and the JOURNAL have been the means of bringing to notice many of the mineral resources of our vast Indian Empire, and of leading to fresh discoveries by the announcement of what had already been found: coal may be adduced as an example,—of which twenty or more different localities have been brought to our knowledge through its pages, where only two were before known. Of the native mineral productions, iron, copper, gold, &c. :—Of the native arts and manufactures, salt, nitre, turpentine, dyes, mills, &c. numerous original ac-

counts have been inserted : catalogues of woods, medicinal plants and drugs : experiments on materials, wood, iron, cement ;—Statistical reports ;—descriptions of newly explored countries and people :—in fact, it would be difficult to open a number of the JOURNAL without finding some information which must possess value in the eyes of a government. Contributions of a more exclusively scientific nature have, in the mean time, continued to multiply, and the objects pointed out as desiderata at home in the geography, meteorology, geology, and natural history of this country, are in the course of rapid and systematic elucidation. So numerous for instance have been the registers of the weather offered for publication, that space could only be found for abstracts of many. There has hardly been time for the collection of materials regarding the tides of the Indian coasts, suggested in the Rev. Professor WHEWELL's circular, (inserted in page 151,) but the attention of those who have opportunities of eliciting the information required, is again solicited to this object.

As a proof of the benefit conferred on science by the free and extensive circulation of a periodical devoted to such objects, the Editor feels pride in alluding to the ardour which his plates of ancient coins have inspired in many active collectors, and above all to the reward bestowed on himself by the munificence of General VENTURA, the most successful pursuer of antiquarian research in the Panjáb, who has presented to him all the coins and relics discovered on opening the celebrated Tope of Manikyala. They are now on their way to Calcutta.

That extracts and analyses of European science have not been more frequent must be attributed once more to want of space and want of leisure. The Editor would recommend all who seek for knowledge of the progress of science in Europe to procure a copy of the Reports of the British Association for 1832, in which they will find every branch discussed by the philosopher best able to give it illustration. To attempt to shorten those admirable essays would be mutilation rather than abridgment ; yet unfortunately most of them are too long for the pages of a monthly journal.

On the subject of orthography of native words, the Editor is driven to make one concession, for which he fears the learned Societies at home

will denounce him as an apostate to the system of their leader. Every communication, with hardly any exception, which comes for publication, adopts the Gilchristian mode of spelling, or that modification of it which has been *ordered* to be used in all Government records, surveys, &c. An attempt has been made hitherto to conform the whole to Sir William JONES' method, but necessarily there have been continual omissions, and the contributors in most cases express themselves but ill pleased to see their words transformed into shapes but ill accordant with ordinary *English* pronunciation. The Editor has therefore resolved to adopt the middle course followed in HAMILTON's Hindustan, namely, to print all Indian names and words in the ordinary roman type as they are usually written and pronounced, and to place in italics all such native terms and proper names, as are corrected, and spelt according to the classical standard of Sir William JONES : in many cases the latter may be inserted in brackets after the ordinary word.

Where contributors have occasion to illustrate their papers by plates, it will be a great convenience to the EDITOR to have the original drawings prepared of the same dimensions as the printed page of letter press, to save the trouble and expence of reducing them.

The EDITOR will not allude in this place to the severe loss he has sustained in the death of some of the most able and constant supporters of his work, and the departure to Europe of others in the course of the past year ; since he hopes that a more worthy channel will be found for the record of their meritorious labours for the cause of Science in India, in the Proceedings of the Asiatic Society, to which their names belong, and in which their reputation must ever be cherished with fond remembrance.

1st January, 1834.

LIST OF SUBSCRIBERS, 1833.

[The names marked with an asterisk have availed themselves of the privilege of taking the Journal gratis, as members of the Asiatic Society : *d*, after a name, denotes *deceased* or *discontinued*.]

The Honorable the Court of Directors, (By the Secretary to Government, General Department,) one copy.

*The Right Honorable Lord W. C. BENTINCK, Governor General, &c. one copy.

*The Honorable Sir C. T. METCALFE, Bart. Member of Council, one copy.

*The Honorable Sir E. RYAN, Knt. Chief Justice, one copy.

*The Right Rev. Lord Bishop of Calcutta, one copy.

The Venerable Archdeacon CORRIE, one copy.

Subscribers for twelve copies.

The Physical Class, Asiatic Society.

Subscribers for four copies.

Hyderabad Book Society.

Subscribers for two copies.

P. Andrew, Esq. Calcutta.

Major A. Irvine, Delhi.

J. J. Malvery, Esq. Bombay.

Subscribers for one copy.

Abercrombie, Lieut. W. Hazareebagh.

Agra Book Club.

*Anburey, Col. Sir Thos. Calcutta.

Artillery Book Club, Dum-Dum.

Atherton, H. Esq. Futtighurh.

*Avdall, J. Esq. Calcutta.

Baikie, Dr. Ootacamund.

Baker, Capt. H. C. England.

Baker, Lieut. W. E. Seharanpur.

Ballard, Geo. Esq. Calcutta.

Barlow, J. H. Esq. Bagundec.

Barrett, M. Esq. Calcutta.

Barrow, H. Esq. Ditto.

Batten, J. H. Esq.

Batten, G. M. Esq. Calcutta.

Beatson, Lieut.-Col. W. S. Ditto.

Beckett, J. O. Esq. Coel.

Bedford, Capt. J. Allahabad.

Bell, Dr. H. P. Calcutta.

Bengal Club, Ditto.

Benson, W. H. Esq. England.

*Benson, Major R. Ditto.

Betts, C. Esq.

Bird, W. W. Esq. Calcutta.

Blair, Major J. Bareilly.

Blake, Capt. B. Cuttack.

Blake, H. C. Esq. Dhobah, near Culnah.

Blechynden, A. H. Esq. Calcutta.

Boileau, Lieut. J. T. Agra.

Boileau, Lieut. A. H. E. Ditto.

Bombay Asiatic Society.

Boulderson, H. S. Esq. Seharanpur.

Boulderson, S. M. Esq. Azimgurh.

Boutrons, T. Esq. Purneah.

Bramley, Dr. M. J. Calcutta.

Brander, Dr. J. M. Cuttack.

Bridgman, J. H. Esq. Goruckpore.

Bridgman, Lieut. P. Agra.

*Briggs, Col. J. Nagpore.

Brittridge, Capt. R. B. Bareilly.

Brooke, W. A. Esq. *d*.

Brownlow, C. Esq. Calcutta.

Brown, Capt. W. Seharanpur.

Brown, Lt. E. J. Engineers, Allahabad.

Browne, G. F. Esq. Jounpore.

Bruce, W. Esq. Calcutta.

*Bryant, Col. Sir J. Head Quarters.

*Burke, W. A. Esq. Ditto.

*Burnes, Lieut. A. England.

*Burney, Major H. Ava.

Burt, Lieut. T. S. Allahabad.

Butter, Dr. D. Ghazipur.

Bushby, G. A. Esq. Calcutta.

Byrn, W. Esq. Ditto.

Calcutta Periodical Book Society.

*Calder, J. Esq. Calcutta.

Campbell, Dr. D. Mirzapore.

Campbell, D. A. Esq. Nipal.

Campbell, J. Esq. Cawnpore.

Campbell, Dr. Arch. Moulmayne.

Carey, Rev. Dr. W. Serampore.

Carr, W. Esq. Calcutta.

Carte, Dr. W. E. Hansi.

Casanova, Dr. J. Calcutta.

*Cautley, Lieut. P. T. Seharanpur.

Chambers, R. G. Esq. Surat.

Cheek, Dr. G. N. Bancoorah.

Clarke, Dr. J. Calcutta.

Coignard, E. Esq. Junghipur.

Cole, R. Esq. Madras.

*Colvin, Major J. Delhi.
 Colvin, A. Esq. *d.*
 *Colvin, J. R. Esq. Calcutta.
 Conolly, Lieut. E. B. Cawnpore.
 Conoylaul Tagore, Baboo, Calcutta.
 Coombs, Lieut.-Col. *d.*
 Cope, Gunner, Meerut.
 Cracroft, W. Esq. Dacca.
 Crawford, W. Esq. Seharanpur.
 Crommelin, Capt. A. Barrackpur.
 *Csoma de Kőrös, Calcutta.
 Cullen, Col. W. Madras.
 Cunningham, Lieut. J. D. Rajmahal.
 Cunningham, Lieut. A. Berhampur.
 Curtis, J. Esq. Calcutta.

Dalby, Lieut. G. M. Calcutta.
 De Courcy, R. Esq. Kishnaghur.
 Delhi Book Society.
 Dennis, Capt. G. G. Meerut.
 Dickens, T. Esq. *d.*
 Dixon, Capt. C. G. Ajmere.
 Dobbs, A. Esq. Calcutta.
 Dorin, J. A. Esq. Ditto.
 Douglas, H. Esq. Patna.
 Drummond, Capt. J. G. Allahabad.
 Dubois, Col. A. Lucknow.
 Duff, Rev. A. Calcutta.
 Dunlop, Lieut-Col. W. Cawnpore.
 Durand, Lieut. H. M. Meerut.

Eckford, Dr. J. Nussirabad.
 Edgeworth, M. P. Esq. Umbala.
 Editor Bombay Liter. Gaz.
 Editor Calcutta Courier.
 Editor Calcutta Liter. Gaz.
 Editor Colombo Journal, Ceylon.
 *Egerton, C. C. Esq. Calcutta.
 Eisdale, D. A. Esq. Poona.
 Ellerton, J. F. Esq. *d.*
 Elliot, J. B. Esq. Patna.
 Elliot, W. B. Esq. Bauleah.
 Erskine, D. Esq. Elambazar.
 Evans, Dr. Geo. Calcutta.
 Everest, Rev. R. Delhi.
 *Ever, W. Esq. Allahabad.

Fagan, Lieut. G. H. Cawnpore.
 Fagan, Brig. C. S., C. B., Neemuch.
 Falconer, Dr. H. Seharanpur.
 Fane, W. Esq. Allahabad.
 Ferguson, W. F. Calcutta.
 Fiddes, Col. T. Muttra.
 Fisher, Lieut. T. Kachar.
 Fitzgerald, Capt. W. R. Calcutta.
 Forbes, Capt. W. N. Ditto.
 Fraser, H. Esq. (Senr.) Delhi.
 Fraser, A. Esq. Ditto.
 Fraser, C. S. Esq. Saugor.
 Frith, Lieut.-Col. W. H. L. Dum Dum.

Garden, Dr. A. Calcutta.
 Gardner, Col. W. L. Lucknow.
 Gerard, Capt. A. Hansi.
 Gerard, Capt. P. Subathu.
 Gerard, Dr. J. Ditto.
 Gilchrist, Dr. W. Vizianagaram.

*Gordon, G. J. Esq. Calcutta.
 Gorton, W. Esq. Benares.
 Governor (His Exc. the) of Ceylon.
 Gowan, Capt. E. P. Calcutta.
 Greame, H. S. Esq. *d.*
 Graham, J. Esq. Calcutta.
 Grant, J. W. Esq. Hurripaul.
 Grant, Lieut. C. E. *d.*
 Grant, Capt. W. Benares.
 Grant, J. Esq. Calcutta.
 Grey, E. Esq. Calcutta.
 Greenlaw, C. B. Esq. Ditto.
 Gubbins, C. Esq. Delhi.

Hall, Lieut. J. H. Kalladghee.
 Hamilton, H. C. Esq. Bhagulpur.
 Harding, Ben. Esq. Calcutta.
 *Hare, D. Esq. Ditto.
 Harris, F. Esq. Ditto.
 Hart, Dr. T. B. Saugor.
 Henderson, Dr. J. Agra.
 *Herbert, Capt. J. D. *d.*
 Hodges, Lieut. A. Sunderbunds.
 Hodgson, B. H. Esq. Nipal.
 Hodgson, B. Esq. Kishnaghur.
 Holcroft, V. Esq. *d.*
 Homfray, J. Esq. Care of Messrs. Jessop
 and Co.

Horse Brigade, Artillery, Meerut.
 Howrah Dock Company, Calcutta.
 Howstoun, R. Esq. Backergunge.
 Huddleston, Lieut. H. Goruckpur.
 Hunter, R. Esq. Purí.
 Hunter, J. Esq. *d.*
 Hutchinson, Major G. Calcutta.
 Hutchinson, Capt. F. Bombay.
 Hutton, Lieut. T. Neemuch.

Inglis, Esq. China.
 India Gaz. Press, Calcutta.
 Inverarity, Lieut. J. Engineers, Madras.

Jackson, Dr. A. R. Calcutta.
 Jeffreys, Dr. J. Ditto.
 Jenkins, Capt. F. Ditto.
 Jervis, Capt. Thos. Ootacamund.
 Jones, Capt. N. Cawnpore.
 Jopp, Capt. J. Poona.
 Kali Kissen, Moharaja, Bahadoor.
 Kean, Dr. Arch. Murshedabad.
 Kennedy, Lieut. T. Bombay. *d.*
 Kerr, A. J. Esq. Malacca.
 King, Dr. Geo. Patna.
 Kassipersaud Ghosa, Baboo, Calcutta.
 Kyd, J. Esq. Ditto.
 Laidly, J. W. Esq. Beerbhoom.
 Lamb, G. Esq. Dacca.
 Lambert, W. Esq. Allahabad.
 Langstaff, Dr. J. Calcutta.
 Langhton, Dr. R. *d.*
 Law, J. S. Esq. Surat.
 Lindsey, Dr. A. K. Chunar.
 Lindsay, Col. A. Dum Dum.
 Lloyd, Capt. Rich. Calcutta.
 Lockett, Col. A. Ajmere.
 Logan, Geo. Esq. Seharanpur.
 Logiu, J. S. Esq. Hyderabad.

- Louis, J. Esq. Bouleah. *d.*
 Louis, T. Esq. Moradabad.
 Lowther, W. Esq. *d.*
 Lowther, R. Esq. Allahabad.
 Lushington, G. T. Esq. Bhurtpoor.
 Macdonald, Lieut. R. Saugor.
 Macdowal, W. Esq. Rungpur.
 Macfarlan, D. Esq. Calcutta.
 Macgregor, D. W. L. Loodianah.
 MacCheyne, W. O. H. Esq. Nusseerabad.
 Mackenzie, Lieut. J. 8th L. I. Cawnpore.
 Maclean, Dr. J. Bombay.
 Macleod, D. A. Esq. Assam. *d.*
 Macleod, Col. D. Murshedabad.
 *Macnaghten, W. H. Esq. Calcutta.
 Macpherson, Lieut. S. Hyderabad.
 MacRitchie, J. Esq. Bancurah.
 Madras Club.
 Mainwaring, T. Esq. *d.*
 Malcolmson, Dr. I. N. Nagpore.
 Mannuk, M. M. Esq. Calcutta.
 Manson, Capt. J. Bittour.
 Marshall, Capt. G. T. Calcutta.
 Marshman, Rev. Dr. J. Serampore.
 Martin, Lieut. R. Delhi.
 *Martin, J. R. Esq. Calcutta.
 Martin, C. R. Esq. Ditto.
 Martin, W. B. Esq. Indore.
 Master, W. Esq. Calcutta.
 *Mendez, F. Esq. Ditto.
 Mess Library, 11th Light Dragoons.
 Miles, Lt. R. H. Futtyghur.
 *Mill, Rev. Principal Dr. W. H.
 Milner, Captain E. T. Almorah.
 Military Board, Calcutta.
 Military Library Society, Mhow.
 Montgomery, Dr. W. Penang.
 Montrion, Lt. C. Calcutta.
 Moore, Capt. J. A. Hyderabad.
 Morgan, R. W. Esq. Tirhoot.
 Morley, C. Esq. Calcutta.
 Morris, J. C. Esq. for Mad. Lib. Socy.
 Madras.
 Morris, J. C. Esq. Arrah.
 Morse, Major A. Bombay.
 Mouatt, Lt. James A. Kurnal.
 Mouatt, Dr. J. A. Pres. Bangalore B.
 Socy. Bangalore.
 Muller, A. Esq. Calcutta.
 Murray, Capt. H. R. Noacolly.
 Muzzufferpore Book Club, Tirhoot.
- Napier, Lieut. R. J. Seharanpur.
 Nash, Dr. D. W. Hyderabad.
 Nicholson, Capt. M. Jabalpur.
 Nicholson, S. Esq. Calcutta.
 Nisbet, W. Esq. *d.*
 Noton, B. Esq. England.
 Nussirabad Book Society.
- Officers, 73rd Regt. N. I. Benares.
 ——— H. M. 16th, Chinsurah.
 ——— 40th Regt. N. I. Allyghur.
 ——— 12th Regt. N. I. Lucknow.
 Oliver, Major T. Nussirabad.
 Oliver, Hon'ble W. Madras.
 Ommaney, Lieut. E. L. Dacca.
- Ommaney, M. C. Esq. Saugor.
 Ostell, T. Esq. Calcutta.
- Pakenham, T. Esq. Calcutta.
 Parental Ac. Institution, Ditto.
 Parker, H. M. Esq. Ditto.
 Patrick, W. Esq. Fort Gloster.
 Patton, Capt. J. W. *d.*
 *Pearson, Dr. J. T. Calcutta.
 *Pemberton, Capt. R. B. on Survey.
 Persidh Narair Sing, Baboo, Benares.
 Piddington, H. Esq. Chouadinga Factory.
 Pigg, T. Esq. Calcutta.
 Playfair, Dr. Geo. Meerut.
 Plumb, J. R. Esq. Calcutta.
 Poole, Col. E. Ditto.
 Pratt, Geo. Esq. Purneah.
 Presgrave, Major D. Saugor.
 *Prinsep, H. T. Esq. Calcutta.
 Prinsep, Miss, England.
 *Prinsep, C. R. Esq. Ditto.
 *Procter, Rev. T. Ditto.
 Proprietors of the John Bull, Ditto.
 Pyle, J. C. Esq. Futtyghur.
- *Radhacaunt Deb, Baboo, Calcutta.
 *Ramcomul Sen, Baboo, Ditto.
 Ramsay, Capt. W. H. Head Quarters.
 Ranken, Dr. J. Delhi.
 Rattray, R. H. Esq.
 *Ravenshaw, E. C. Esq.
 Renny, Lieut. T. Agra.
 Renney, D. C. Muttra.
 Rhodes, D. W. Sylhet.
 *Richy, Monsr. A. L. Calcutta.
 Roberts, Major A. Ditto.
 Robertson, T. C. Esq. Sylhet.
 *Robison, C. K. Esq. Calcutta.
 Rogers, Esq. Ditto.
 Ross, A. Esq. Ditto.
 *Ross, D. Esq. Ditto.
 Ross, Capt. D. Gwalior.
 Routh, W de H. Esq. Boolundshuhr.
 Row, Dr. J. Bandah.
 Royle, Dr. J. England.
 Ruspini, Rev. W. Dinapur.
- *Sage, Capt. W. Dinapur.
 Sale, Lieut. T. H. Delhi.
 Sanders, Capt. E. Cawnpur.
 Sandy, T. E. Esq. Arrah.
 Sandys, Rev. T. Calcutta.
 Satchwell, Capt. J. Dinapur.
 Saunders, Geo. Esq. Calcutta.
 Saunders, J. O B. Esq. Coel.
 Scott, D. Esq. Burdwan.
 Seaton, Lieut. T. Jamalpur.
 Sevestre, Robt. Esq. Calcutta.
 Shaw, T. A. Esq. Chittagong.
 Shore, Hon'ble F. J. Futtyghur.
 Shortreed, Lieut. R. Poona.
 Siddons, Lieut. H. Berhampore.
 Simmonds, Capt. J. H. *d.*
 Sleeman, Capt. W. H. Jabalpur.
 Sloane, W. Esq. Tirhoot.
 Smith, T. P. Esq. Baitool.

- Smith, Samuel and Co. Calcutta.
 Smith, Capt. E. Ditto.
 Smith, Lieut. J. T. Musulipatam.
 Smyth, Capt. W. H. Calcutta.
 Smyttan, Dr. Geo. Bombay.
 Society Nat. His. Mauritius.
 Southby, Capt. F. S. Calcutta.
 Sparks, Capt. J. P. Ghazipur.
 Speed, D. W. H. Esq. Calcutta.
 Spiers, A. Esq. Allahabad.
 Spilsbury, Dr. G. G. Jabalpur.
 Spry, Dr. H. H. Saugor.
 Stacy, Lieut.-Col. L. R. Nussirabad.
 Stacy, S. P. Esq. Calcutta.
 Stainforth, F. Esq. Goruckpur.
 Stephenson, J. Esq. Patna.
 Stevenson, Dr. W. Jun. Calcutta.
 *Stirling, E. Esq. Allyghur.
 Strokes, Dr. J. Hamirpur.
 *Strong, F. P. Esq. Calcutta.
 Sutherland, Capt. E. Calcutta.
 Sutherland, Hon'ble J. Bombay.
 Sweetenham, H. Esq. Futtighur.
 Swiney, Dr. J. Kurnal.
 *Swinton, G. Esq. England.
 Sylhet Book Club.
- Tanner, Capt. W. F. H. Monghyr.
 Taylor, T. G. Esq. H. C. Astronomer,
 Madras.
 Tayler, J. Esq. Dacca.
 Telfair, C. Esq. Mauritius *d*.
 Terraneau, Capt. W. H. Sylhet.
 Thomas, C. Esq. Singapore.
 Thomas, Dr. W. Barrackpur.
 Thomas, E. F. Esq. Kemaon.
 *Thomason, J. Esq. Azimgurh.
 Thompson, Capt. G. Hazareebagh.
 Thompson, Capt. J. Calcutta.
 Thoresby, Capt. C. Berhampur.
 Tickell, Col. R. Barrackpoor.
- Tierney, M. J. Esq. *d*.
 Trade Association, Calcutta.
 Trail, G. W. Esq. Kemaon.
 Tremenhert, Lieut. G. B. Delhi.
 *Trevelyan, C. E. Esq. Calcutta.
 *Trotter, R. Esq. Gyah.
 *Troyer, Capt. A. Calcutta.
 Turner, T. J. Esq. Seharanpur.
 Twemlow, Capt. G. Arungabad.
 *Twining, W. Esq. Calcutta.
 *Tytler, J. Esq. Ditto.
- Udny, C. G. Esq. Calcutta.
- Vicary, Lient. N. Meerut.
- *Wade, Capt. C. M. Loodianah.
 Walters, H. Esq. Chittagong.
 *Wallich, N. Esq. Calcutta.
 Warner, Capt. J. H. Bauleah.
 *Watson, Col. T. C. Dacca.
 Watt, A. Esq. Singapur.
 Waugh, Lient. A. H. Agra.
 Webb, L. W. Esq. Surat.
 Wells, F. O. Esq. Monghyr.
 Western, Lieut. J. R. Midnapur.
 White, Rev. E. Cawnpore.
 Wilcox, Capt. R. Gt. Trig. Surv.
 Wilkinson, W. Esq. Pooree.
 Wilkinson, J. E. Esq. *d*.
 Winfield, Capt. J. S. Bhopal.
 *Wilson, H. H. Esq. England.
 Wise, Dr. T. A. Hoogly.
 Wise, J. P. Esq. Dacca.
 *Withers, Rev. G. N. Calcutta.
 Wood, Dr. Arthur, Simlah.
 Woodburn, Dr. D. Shirghati.
 Woollaston, M. W. Esq. Calcutta.
- Zeigler, L. Esq. Setapur.

CONTENTS.

No. 13.—JANUARY.

	<i>Page.</i>
I.—Continuation of the Route of Lieut. A. Burnes and Dr. Gerard, from Pesháwar to Bokhára.	1
II.—On the Manufacture of Saltpetre, as practised by the Natives of Tírhút. By Mr. J. Stevenson, Supt. H. C.'s Saltpetre Factories in Behar.	23
III.—On the Greek Coins in the Cabinet of the Asiatic Society. By James Prinsep, Secretary.	27
IV.—Eclipses of Jupiter's Satellites...	41
V.—A method of preparing Strychnia. By J. T. Pearson, Esq. Assistant Surgeon.	42
VI.—Proceedings of the Asiatic Society.	43
VII.—Miscellaneous.	
1.—Hot-spring at Pachete. By C. Betts, Esq...	46
2.—Extraordinary Banyan Tree at Kulow Nagty Hally, near Bhuoma Naik Droog, in the territory of Mysore...	47
3.—Discovery of the Silhet Coal Mines...	<i>ib.</i>
4.—Questions proposed by the Burmese Heir Apparent.	<i>ib.</i>
VIII.—Progress of Astronomical Science.	48
IX.—Meteorological Register.	56

No. 14.—FEBRUARY.

I.—Note on the Origin of the Kala-Chakra and Adi-Buddha Systems. By Mr. Alexander Csoma de Körös...	57
II.—Journal of a March from Ava to Kendat, on the Khyendwen River, performed in 1831, by D. Richardson, Esq. Assistant Surgeon of the Madras Establishment, under the orders of Major H. Burney, the Resident at Ava.	59
III.—Trisection of an Angle. By Lieut. Nasmyth Morrieson, W. S.	71
IV.—Short Description of the Mines of Precious Stones, in the District of Kyat-pyen, in the Kingdom of Ava.	75
V.—Note on Saline Deposits in Hydrabad. By Assistant Surgeon J. Malcolmson, Madras European Regiment.	77
VI.—An Experimental Inquiry into the Means employed by the Natives of Bengal for making Ice. By T. A. Wise, Esq. M. D.	80
VII.—Proceedings of the Asiatic Society...	91
VIII.—Systematically arranged Catalogue of the Mammalia and Birds belonging to the Museum of the Asiatic Society, Calcutta. By Dr. W. Warlow.	96
IX.—European Notices of Indian Natural History.	
1.—The Dugong.	100
2.—Nipal Specimens.	101
X.—Meteorological Table for February.	104

No. 15.—MARCH.

I.—On the Restoration of the Ancient Canals in the Delhi Territory. By Major Colvin, Engineers...	105
II.—Abstracts of Observations of the Temperature, Pressure, and Hygrometrical State of the Air at Nasirabad. By Major T. Oliver...	128
III.—Determination of the Constant of Expansion of the Standard 10-feet Iron Bar of the great Trigonometrical Survey of India; and Expansions of Gold, Silver, and Copper by the same Apparatus. By James Prinsep...	130
IV.—Continuation of Dr. Gerard's Route with Lieut. Burnes, from Bokhára to Meshid...	143
V.—Proceedings of the Asiatic Society. Whewell's Desiderata on the subject of Tides...	149
VI.—Madras Literary Society.	154
VII.—Miscellaneous.	
1.—Indian Botany...	156
2.—Indian Geology.	157
3.—Indian Arts and Manufactures.	158
4.—Note on Lieut. Burt's Instrument for trisecting Angles.	159
VIII.—Meteorological Register for March.	160

No. 16.—APRIL.

I.—Account of the Jain Temples on Mount Abú in Guzerát. By Lieut. Burnes, Bombay Army...	161
II.—List of Indian Woods collected by N. Wallich, M. D., F. R. S., Corresponding Member of the Royal Institute of France, and the Academy of Sciences at Berlin, &c. and of the Society of Arts of London; Superintendent of the Botanic Garden at Calcutta...	167
III.—Table for Ascertaining the Heights of Mountains from the boiling point of Water. By James Prinsep, Sec., &c...	194
IV.—Translation of a Tibetan Passport, dated A. D. 1688. By M. Alex. Csoma de Kőrös.	201
V.—Proceedings of the Asiatic Society.	203
VI.—Miscellaneous.	
1.—Indian Meteorology.	206
2.—Indian Arts and Manufactures.	209
3.—Phenomenon of the Japanese Mirror.	214
VII.—Meteorological Register for April.	216

No. 17.—MAY.

I.—Origin and Classification of the Military Tribes of Nipal. By B. H. Hodgson, Esq...	217
II.—Description of Bokhára. By Lieut. A. Burnes, Bombay Army, Assistant Resident at Kutch.	224
III.—On the Climate of Nagpúr. By W. Geddes, Surgeon, Mad. Eur. Reg...	239
IV.—Table shewing the Rise of Spring Tides in Bombay Harbour, during night and day, for the year 1832, communicated by Ben. Noton, Esq...	247
V.—On the Native Manufacture of Turpentine.	248
VI.—Description of a Sun Dial in the Court of the Moti Masjid, in the Fort of Agra. By Capt. J. T. Boileau, Engineers...	251
VII.—Catalogue of the most remarkable Celestial Objects visible in the Horizon of Calcutta, arranged in order of Right Ascension...	252
VIII.—Description of a Compensation Barometer, and Observations on Wet Barometers. By J. Prinsep, Sec., &c...	258

	<i>Page.</i>
IX.—Proceedings of the Asiatic Society.	262
X.—Miscellaneous.	
1.—Rustic Bridge.	267
2.—Remarks on the Paper on the Trisection of an Angle in No. 14. of the "Journal of the Asiatic Society."	268
3.—New Patent Improved Piano-Forte.	269
4.—Specific Gravity of Metallic Alloys.	270
5.—Proportion of Recent and Fossil Shells.	<i>ib.</i>
6.—Table of the Lengths in British Miles of the Degrees of Latitude and Longitude from 0° to 30°, with the Areas bounded by them in Square Miles	271
XI.—Meteorological Register for May.	272

No. 18.—JUNE.

I.—On the Marriage Rites and Usages of the Jāts of Bharatpūr. By G. T. Lushington, C. S.	273
II.—Report on the Geology of Hyderabad. By H. H. Voysey, Esq. Surgeon and Geologist to the Great Trigonometrical Survey of India, 1819.	298
III.—On the reputed Descendants of Alexander the Great, in the Valley of the Oxus. By Lieut. Alexander Burnes, Bombay Army.	305
IV.—On the "Topes" and Grecian Remains in Panjāb. By Lieut. Burnes, Bom- bay Army.	308
V.—Note on Lieutenant Burnes' Collection of Ancient Coins. By James Prinsep, Sec., &c.	310
VI.—Astronomical Observations at Bareilly. By H. S. Boulderson, Esq.	318
VII.—Notice of a Native Sulphate of Alumina from the Aluminous Rocks of Nipal. By J. Stevenson, Superintendent H. C. Saltpetre Factories in Behar.	321
VIII.—Notice of a Native Sulphate of Iron from the Hills of Behar, and used by Native Dyers of Patna. By Ditto.	321
IX.—Notice of Analysis of the Ashes of four Indian Plants. By Ditto.	322
X.—Proceedings of the Asiatic Society.	323
XI.—Miscellaneous.	

Synopsis of the Winds, Weather, Currents, &c, between Bombay and Suez,
throughout the Year. By Capt. J. P. Sanders, Bombay.

XII.—Meteorological Register for June.	328
--	-----

No. 19.—JULY.

I.—The Birth of Umā—a Legend of Himalāya—by Cálidāsa.	329
II.—Description of the Pan-chaki or Native Water-mill.	359
III.—Description of the Salt Works at Panchpadder, Mewār. By Lieut. A. Burnes, Bombay Army.	365
IV.—Proceedings of the Asiatic Society.	367
V.—Report of the Committee appointed on the 27th March, 1833, to consider on the expediency of recommending to the Government the continuance of the Boring Experiment.	369
VI.—Miscellaneous.	
1.—Remarks on Hutton's Mathematics.	374
2.—The Royal Society.	375
3.—Discovery of a Bed of Fossil (Marine?) Shells on the Table Land of Central India.	376
4.—Indian Zoology.	377
VII.—Analysis of Books.—Taylor's Astronomical Observation at Madras.	380

	<i>Page.</i>
VIII.—Meteorological Table kept at Bancoora, for the year 1832, by John Mac-Ritchie, Esq.	383
IX.—Meteorological Register for July.	384

No. 20.—AUGUST.

I.—Origin of the Shákya race, translated from the Q[(La), or the 26th, volume of the mDo class in the Ká-gyur, commencing on the 161st leaf. By M. Alex. Csoma de Körös,.. . . .	385
II.—Second Report on the Geology of Hyderabad. By H. W. Voysey, Esq. Surgeon and Geologist to the Trigonometrical Survey of India, dated Secanderabad, the 28th June, 1820.	392
III.—Bactrian and Indo-Scythic Coins—continued. By James Prinsep, F. R. S. Sec. As. Soc.	405
IV.—Note on the Zoology of the 2nd Part of the Transactions of the Physical Class of the Asiatic Society of Bengal,.. . . .	417
V.—Note on the extraordinary Fall of the Barometer during the Gale of the 21st May last. By James Prinsep, Sec. &c.,.. . . .	427
VI.—Climate of Singapúr,.. . . .	428
VII.—Culminating stars observed with the Moon at Násirabád. By Lieut.-Col. Thomas Oliver, &c.,	432
VIII.—Chemical Analyses. By James Prinsep, Sec. &c.,	434
IX.—Earthquake,	438
X.—Meteorological Register, for August,	440

No. 21.—SEPTEMBER.

I.—An Inquiry into the Laws governing the two great powers, Attraction and Repulsion, as operating on the Aggregation and Combination of Atoms. By Julius Jeffreys, Esq. Bengal Medical Service,	441
II.—On Progressive Development in the cold-blooded Vertebrata. By D. W. Nash, Asst. Surgeon, Beng. Est. A. L. S. Corresp. Member S. A...	465
III.—Some Geological remarks made in the country between Mirzapúr and Ságár, and from Ságár northwards to the Jamna. By the Rev. R. Everest, F. G. S. &c.,	475
IV.—On the Notice of Alum or Salájit of Nipal. By A. Campbell, Assistant Surgeon, &c...	482
V.—Defence of Lt. Burt's Trisection Instrument,	485
VI.—Computation of the Area of the Kingdoms and Principalities of India,	488
VII.—Miscellaneous.	
1.—Importation of Ice from Boston,	491
2.—On the Action of various Lights upon the Retina. By Sir D. Brewster,.. . . .	494
3.—Substances contained in Opium,	495
3.—Death of Captain J. D. Herbert,	ib.
VIII.—Meteorological Register for August,	496

No. 22.—OCTOBER.

I.—A visit to the Gold Mine at Batting Moring, and Summit of Mount Ophir, or "Gunong Ledang," in the Malay Peninsula. By Lieut. J. T. Newbold, 23rd Regt. Mad. L. Inf.	497
II.—On the Nest of the Tailor Bird. By Lieut. T. Hutton, 37th Regt. N. I.	502
III.—An Inquiry into the Laws governing the two great powers, Attraction and Repulsion, as operating in the Aggregation and Combination of Atoms. By Julius Jeffreys, Esq. Bengal Med. Est.	506

Page.

IV.—Iron Suspension Bridge over the Beosi River, near Sagar, Central India.	
Pl. XVI.	538
V.—Additional Note on the Climate of Nagpúr. By J. Prinsep, Sec. As.	
Soc. &c.,	542
VI.—Proceedings of the Asiatic Society,	546
VII.—Analysis of Books,	551
VIII.—Miscellaneous.	
1.—Circular Instructions from the Geological Society, for the Collection of Geological Specimens,	557
2.—Mirrors of Fusible Alloy,	559
3.—Liverpool and Manchester Railway,	ib.
IX.—Meteorological Register for September,	560

No. 23.—NOVEMBER.

I.—On the Colossal Idols of Bamián. By Lieut. Alexander Burnes, Bombay Army,	561
II.—Account of the Earthquake at Kathmandú. By A Campbell, Esq. Assistant Surgeon, attached to the Residency,	564
III.—Census of the Population of the City and District of Murshedabad, taken in 1829,	567
IV.—List of Birds collected in the Jungles of Borabhúm and Dholbhúm. By Lieut. S. R. Tickell, 31st Regt. N. I.,	569
V.—Note on the Fossil Bones discovered near Jahalpúr. By J. Prinsep, Sec. As. Soc.	583
VI.—Report on a Collection of Objects of Natural History. By the Curator of the Museum of the Asiatic Society,	588
VII.—Note on the Genus Spiraculum. By J. T. Pearson, Curator As. Soc.	590
VIII.—On the Kukumb ka Tel, or concrete Oil of the Wild Mangosteen,	592
IX.—Note on the Coal discovered at Khyúk Phýú, in the Arracan District,	595
X.—Analysis of Books.—Transactions of the Batavian Society,	597
XI.—Miscellaneous.	
1.—Register of the Temperature of Ghazipúr. By the Rev. R. Everest,	604
2.—Note on the Salájit of Nipal,	605
3.—Summary Sketch of the Geology of India,	606
XII.—Meteorological Register for Nov. 1833,	608

No. 24.—DECEMBER.

I.—A short Account of the Charak Púja Ceremonies, and Description of the Implements used. By Ram Comul Sén, Native Secretary, Asiatic Society.	609
II.—Specimens of some Ornamental Forms of Persian Writing. By Mahá Rájá Káli Kishen Behadúr, of Calcutta,	613
III.—Description of an Indian Balance, called Tula. By the same,	615
IV.—Abstract of a Meteorological Journal, kept at Kotgarh, (Lat. 31° 11' 45" N. Long. 77° 27' 49" E.) Subathú, and the intermediate places in the Himálaya mountains for 1819-20. By Captain Patrick Gerard, 9th Regt. B. N. I.	615
V.—Notes on the Specimens of the Kankar Formation, and on Fossil Bones collected on the Jamna. By Captain E. Smith, Bengal Engineers,	622
VI.—Further particulars of the Earthquake in Nipal. By A. Campbell, Esq. Assistant Surgeon, attached to the Residency,	636
VII.—Note on the Fossil Palms and Shells lately discovered on the Table-land of Sagar in Central India. By H. H. Spry, Esq. Bengal Medical Service,	639
VIII.—Meteorological Register at Bareilly in 1831. By H. S. Boulderson, Esq.	641

	<i>Page.</i>
IX.—Proceedings of the Asiatic Society,	645
X.—Miscellaneous.	
1.—Note on the Tailor Bird's Nest. By Lieut. Gifford.	648
2.—Note on the Inscription on the Hindu Coins. (Plate VIII. Fig. 15.) ..	649
3.—Radiation in Valleys.	<i>ib.</i>
4.—Bones in the Delta Alluvium.	<i>ib.</i>
5.—Fall of Fish from the Sky.	650
6.—Fossil Shells near Herat.	652
7.—Cochineal.	<i>ib.</i>
8.—Reply to the Questions of the Burmese Philosopher Prince, ..	653
9.—Cave of Secanderiah, near Tabriz.	658
XI.—Meteorological Register for December, 1833.	660

JOURNAL

OF

THE ASIATIC SOCIETY.

No. 1.—January, 1833.

*I.—Continuation of the Route of Lieutenant A. Burnes and Dr. Gerard,
from Pesháwar to Bokhára.*

[The same gentleman who favoured us with the sketch of the route of these travellers to Pesháwar (vol. I. 145) had prepared a continuation of his account, derived from the private letters of Dr. Gerard, for insertion in the present number. While printing it, however, we were, through the kindness of Captain A. Gerard, put in possession of copies of his brother's more recent letters to himself: we have availed ourselves of both; merely arranging the extracts in the order of the places visited; and we beg to offer our acknowledgments to both of our contributors for their permission to give publicity to private correspondence, in the absence of any direct communication to ourselves, relative to a journey which excites so much interest.—ED.]

THE travellers reached Pesháwar about the 15th March, Kabúl on the 1st May, Khulm, on the 30th May, and Balkh, before the 10th of June. They appear to have made twenty-six marches to the latter place, and to have traversed a space of about five hundred miles. They were induced to stop about 61 days at the principal cities on their way: of which 34 were spent at Pesháwar, 17 at Kabúl, and 10 at Khulm.

“ The trip from Pesháwar to Kabúl, was very harassing, and to me, ill of fever, superlatively so. The country is naturally difficult, and our merciless guide drove us about regardless of heat and cold; rain, and shelter. Our stay in Kabúl was too short to recover such an exertion, and I left that place in the same state of health as I arrived. Dost Muhammed Khan's treatment of us was highly satisfactory, and more than we durst have relied upon, considering the position he occupies. We had none of the assiduous attentions and caresses of his brother at Pesháwar: his character does not admit of familiarity, while his situation equally forbids it; but his civilities were of the first estimation. Kabúl is rising into

power under his republican spirit of government, and I should say is destined to an importance in spite of itself, for in every view it is the key to India. It is astonishing how much the country is relieved by the overthrow of the royal dynasty; and with respect to the latest reigns of the Timúr family, the change in the condition of things for the better is not more wonderful than it is natural. In Shah Shujah's haughty career, there was little security in all we most value, and robberies and bloodshed disgraced the precincts of his court. Dost Muhammed's citizen-like demeanor and resolute simplicity have suited the people's understanding; he has tried the effect of a new system, and the experiment has succeeded.

My fellow traveller pursues a very good plan for any political object, by keeping up correspondence with every one who has treated him with civility; particularly with our friends in Kábul and Pesháwar. We may soon have to ask Sultán Muhammed for a supply of coals to navigate the Indus; mines have been discovered; and they ought to be worked upon scientific principles. Moorcroft searched in vain for seams, but no doubt the people took up the hint. The specimens which were brought to us indicate the variety to be what is termed anthracite, or slate coal, and consequently as fuel is very meagre; but this may be the exterior crust or shell, and when penetrated, a richer material may be discovered. We saw it in thin plates, of a concave-convex form; the fracture was grey, but without any lustre, and it soiled paper; at first I took it for graphite or plum-bago, and I shall not be surprised if that mineral is contiguous. It burnt by the flame of a candle, and gave out a dense gas. We should have sent a specimen to Calcutta, had an opportunity offered. The mine is in the district of Kohát, in the plain-ward hills, and therefore most conveniently situated at the navigable extremity of the Indus. I hear there are mines in Cuch, which thus sets the question of physical capabilities at rest, and supplies the only remaining desideratum. Sultán Muhammed Khán would be delighted at the proposal of working the coal seams, for reciprocal advantages must flow from such a medium. There are also sulphur seams in Koliát; and adjacent, even conterminous with that estate, is the fertile country of the Wazírís, famed, I believe, for a superior breed of horses, and report says, rich in indications of auriferous and other precious ores. Moorcroft paid a visit to that district, and I suspect that he was aware of its mineral deposits. The whole of Afghánistán teems with the germs of metallic treasures, but it may be long ere we become better acquainted with those hidden stores. I was disappointed in not discovering any traces of shells or fossils on the route to Kábul, but we durst scarcely look around us. I was too ill besides, and our journey was too precipitate for any useful purpose.

“ We entered Kábul after a fatiguing journey at four o'clock, having been 24 hours from the last encampment, and with the exception of a short slumber our guide unwillingly allowed us at midnight, and my doze upon the raisin bags of a small grocer's dukán by the road side, where my horse made his repast while I reposed, I may say, I was in a high state of corporal suffering during that long period, with a fever raging in my blood, and a fiery heat in my face, which has latterly burned to parchment. I need not describe Kábul to you, who have travelled over the same ground, and I should certainly fail in my attempts, having seen but little of the place. One is not disappointed in the display, after the uniformly arid aspect of the surrounding country; but it is in this contrast, rather than in any peculiar scenery, that we are delighted with the spot. Frail mud houses, which seem only to be renewed by the accessions of patch-work, form a penurious threshold to a great entrepôt of commerce; but when the bazar opens, one is amply gratified by a scene, which for luxury and real comfort, activity of business, variety of objects, and foreign physiognomy, has no living model in India. The fruits which we had seen out of season at Pesháwar loaded every shop; the masses of snow for sale, threw out refreshing chill, and sparkled by the sun's heat: the many strange faces and strange figures, each speaking in the dialect of his nation, made up a confusion more confounded than that of any Babel, but with this difference, that here the mass of human beings were intelligible to each other, and the work of communication and commerce went on. The covered part of the bazar, which is entered by lofty portals, dazzled my sight, even quite as much as the snow of the Himalayan peaks, when reflected against the setting sun. In these stately corridors, the shops rise in benches above each other, the various articles with their buyers and sellers, regularly arranged in tiers, represent so many living strata. The effect of the whole was highly imposing, and I feel at a loss adequately to describe the scene presented to our eyes.

“ Our stay at Kábul furnished few objects of interest; the time passed rapidly, and my own ill health prevented me making any exertion. We were Nawáb Jabar Khán's guests, and though our quarters occupied one side of a square which was a rendezvous for courtiers, we were infinitely more at liberty than at Pesháwar, and even quiet till we were roused up by Mr. Wolff, who amused us greatly by his various adventures. As long as he staid at Kábul, we were in a perpetual stir; the house was filled with Jews.

“ The climate of Kábul was considerably colder than I was prepared for, when the barometer announced an elevation of 6000 feet. The

morning temperature varied between 43° and 47° , and 66 degrees was commonly the maximum of the day; while, in the house, 61° and 63° were the extremes; and this temperature was during the first half of the month of May. This state of the atmosphere is far below that of Simla, but as there are no periodical rains, the summer heat increases till August; and, notwithstanding that, Baber talks of sleeping throughout the year with a *pustín*: in the dogdays, the air is warm enough to make the tops of the houses a comfortable place of rest. Kábul, like Kanáwar, is indebted for its fine climate and luxuriant gardens to the aridity of its atmosphere, and to irrigation. The snowy range, that lies on the north-west, contains within its ramifications many thousand orchards, from which all the dried fruits that fill the bazars of India are supplied. The majestic rhubarb grows there wild, and its succulent stem is one of the luxuries of every house; it has a grateful acidity. Fresh snow fell frequently upon the neighbouring mountains, but none of the peaks appeared to attain a greater height than 16,000 feet. The summits of the true Hindú Kúsh were visible on the north, like heaps of pure snow. Macartney is out at least 20 miles in his latitude of Kábul, which is too low. Rennel's position of it, and also of Kashmír and Kandahár, will be found most correct. Burnes took the elevation of the pole, and it is close upon $34\frac{1}{2}^{\circ}$. The barometer showed a little above 24 inches, and water boiled at 202° . I need not mention our treatment by Jabar Khán, whose character is so well known. Common words would not express the friendly attentions he heaped upon us. He is much too good a man to be connected with the family: his whole pride of distinction is in charitable actions, and a modest, but confident demeanour of person. Of his brother, Dost Muhammed Khán, we have every reason to speak with the greatest respect and satisfaction. He is diminutive in stature, with a common face, which you would pass a dozen times without remark, and fail to distinguish in a mob. He has no state; a single attendant follows him, who is generally the best dressed of the two, and a stranger, fresh from an European or Indian court, would mistake one for the other. His habits correspond with his appearance, and every thing about him partakes of the simplicity of character that raises him above the multitude. It is in conversation, when his countenance becomes brightened with intense animation, that the mind of the chief develops itself, and evinces his intellectual power with the happiest effect.

“The Russian Church is held in high estimation at Kábul, and the Kábulis meet with much attention from the subjects of the Autocrat,

while they are scarcely noticed beyond the Satalj; these opposite receptions of course leave strong impressions on the feelings of individuals.

“Dost Muhammed gave us six introductory letters (one to the king of Bokhara); and on the 18th of May, we took leave of Kábul, under the protecting guarantee of a Nazir, a man of high connexions and repute, who however proved himself anything but agreeable. The opportunity was too favourable to require consideration, the man's character was to be our passport, and as we anticipated difficulties in Morád Bèg's territory, we thought ourselves fortunate; although we afterwards repented.—Our ill-favored guide was proceeding to Russia, to recover the property of his brother, who died there. On this occasion, Dost Muhammed Khán wrote a letter to the Emperor!!”

“The passage of the Hindú Kúsh presents no difficulties, and viewed in any way, shrinks to insignificance, compared with those portions of the snowy chain which you and I have seen. Even as a barrier to an invading army the difficulties are far from formidable by this route. The great pass, which is alone named Hindú Kúsh, is even more accessible, though more lofty; we would have taken that route, but for the dread of encountering Morád Bèg. The pass is worth seeing, especially as we heard some strange stories about flights of birds being so much baffled by the strong wind, that they no longer could fly against it, and actually took to walking for a change, when vast numbers were killed by the natives. The emperor Baber mentions the same thing, and the fact would seem to argue great elevation. The Hindú Kúsh has no longer the configuration of the Himalaya; the steep cliffs of hard compact rock, which characterise that ridge, scarce appear here at all, and few of the peaks attain any remarkable altitude. The most prominent point was Kohi Baba, and I do not believe it rises to 19,000 feet: all the neighbouring heights appeared in bluff masses, resembling the contour of the mountains upon the Chinese frontier and the interior of Kanáwar, which is evidently the effect of a different structure; and as far as I could judge from the nature of the road, wherever the bare rock was exposed, the elements of the whole range are of the class of formations termed secondary; and as we penetrated into the country, the hills changed into slate, gravel, and even mud, which last mixed with loam and calcareous rubble, all indurated by alternations of weather into a rugged hardness, compose the formation of the Bameán “Búts,” or idols, which most people believe, and the natives themselves represent, to be cut out of the solid rock. But to return to the Hindú Kúsh:—we rode up to the pass, which is scarcely 11,000 feet in height; the snow lay deep upon the summit, but was fast retiring before the ardent sun, and

the slopes were only speckled at that limit. The descent was quaggy and tedious, but there was not much of it, and villages appeared at a general level of 10,500 feet. The second pass was nearly 12,000 feet, the adjoining villages hampered by the snow projected their grey turrets through the uniform field of whiteness. The third pass was inaccessible by horses*, and we descended by the hollow of a gorge into a dell that drained off the waters towards Kúndúz and the Oxus. When I beheld the opposite course of the streams, I began to ask, is this the only range that separates Khorasán from Turkistán, and the valley of the Oxus; and when soon after I found our level to be close upon 5000 feet, I conceived that other and loftier ridges crossed our route; but a few more days, and the 13th from Kábul, brought us upon the plains of Tartary, for that name is specifically apposite in the region of Asia, adjoining Bokhára and Samarkhand. My understanding was now enlightened, for I had but vague and ill-defined ideas of the geographical nature of this tract, but in one respect I was not wrong—I never believed there could be any flat expanse, similar to the plains of India: and the fact is so, and could not have been otherwise; and long after we had entered the open country, and crossed the Oxus, a range of snowy mountains on our right-hand (our face being then towards Bokhára), confirmed my conjectures. We were both much surprised at such a sight, particularly as it was of so transitory a nature as nearly to elude our comprehension: it was almost sunset, and the outline, just lighted up, gleamed for a few minutes, and faded into a dim mass. The spectacle was full of grandeur, and left us wondering; for we never saw another trace of the range, or its desolate snows.

“The map gives us very imperfect notions, I should say none at all, on the subject; for the mountains, marked there as snowy, could not have been in sight, and those that seem to indicate their position, are not only black, but occupy a very limited space. Now, heights bearing perennial snow, and far exceeding that marginal boundary, do not often start up abruptly in patches or isolated ridges from a flat expanse of plain; as the routes to Yárkund cross them free of snow at this season of the year, they may not be so elevated as they appear. When thus in the open plains of Turkistán, the thought (which had often amused us) recurred, is the Hindú Kúsh the true limit of the great snowy chain that forms the northern frontier of British India? As to the appearance on the map, the illustration is correct, as far as it goes; but we naturally, and upon cosmogonic grounds, ask,—where is the Himalayan ridge? and where should it go to, but north. It (unfortunately for

* I should rather think my brother means inaccessible on horseback, A. G.

geography) is unknown by that name, and amidst the confusion of such unmeaning designations as Hindú Kúsh, Caucasus, Sáféd Koh (White Mountain), as if snowy mountains should be any other color : to be sure, we have heard of red, to which the map adds blue mountains, white mountains, cloudy mountains, and black mountains (see the map in the octavo edition of Elphinstone's Kábul); besides Taghs and Tukhts, innumerable; and lastly, Parapamisus, which is a fine sounding name, but it unfortunately happens not to exist; there are also Kara or black mountains, which are also salt. Is not all this too bad?—In seeking for the continuity of the Himalaya, we must go north of Ladák, and the sources of the Oxus, where a vast tract of lofty summits will be found to trend towards the skirts of Yárkund, and somewhere near the heads of the Oxus and Jaxartes, to define the slope of the country to the north-west; this will bring the high plateaux, north of the Indus, within more precise limits. All this tract, which is by no means very remote, is still unseen by the eye of civilised man.

“The Búts of Bamean represent a man and woman of colossal magnitude, carved in the cliff of the ridge that bounds the valley on the east. On approaching them, I saw from the very look of the hills, that they could only be moulded in some soft calcareous substance; yet a very intelligent man, a Hají Baba, who was with Moorcroft at the spot, insisted that the figures were in the solid rock, which would indeed have been an anomaly, as the whole of the neighbouring hills and the dell itself is a diluvial, perhaps an alluvial, deposit of mud, clay, and conglomerate. I was certain in my opinion, and took a bet of 100 *groats* to one, with the old Hají, that they were mud, and so they proved to be. A piece of a toe, or part of the nose of one, will decide their structure: it is not gypsum. Though it is rather a disappointment to find mud instead of granite, still these idols are very curious objects, both with regard to antiquity, and as memorials of an epoch, the history of which eludes our research. The written accounts, if they are not vitiated by mythological figures, assign their formation (creation) to the year 56 before the Christian era, which is far from extravagant, considering the nature of the records (Mahábhárát), which give that date; but without attending to these, it is almost certain, that they existed before the time of Muhammed, and when the country was possessed by the kafirs under the dominion of Zohák, whose reign was antecedent to Christianity.—These august idols were mutilated both by Timúr the Great and by Nádir Shah: the former discharged arrows, and the latter fired shots at them. Some faint traditions of Alexander the Great are in the mouths of some of the inhabitants; but there are so many Sikan-

dars that it is almost impossible to extricate the right one. We saw nothing like Greek inscriptions, but heard of many near us. A question readily occurs—is the material of which the idols are constructed calculated to resist the impression of hundreds of years, not to think of a period approaching to thousands? Had I not myself been fully aware of the preservative nature of the climate in the Trans-Himalayan regions, and seen antiquity represented in mud walls, books and other works, which we consider perishable, I should have been staggered at the idea of the Bameán idols' claim to so remote an origin. The aridity of the atmosphere here is pretty similar to that of upper Kanáwar and Tibet, where a thing neither rots or decomposes, but falls to dust in long ages; and the substance of the figures is of that kind which becomes indurated by exposure to the air, and like the mud upon the roofs of the houses, acquires the hardness of the surrounding kankar. Near this we passed a ruined fort, said to have been built in the days of Zohák; the slender walls of unburnt brick were perched upon cliffs, which time had rendered inaccessible. Close to the Búts are the remains of a mud castle, about which some curious traditions are related; but I omit them, lest you might think me as credulous as the people who related them.

Without thinking of the idols, over which superstition and undetermined antiquity have bestowed a false character, there never was a spot better appropriated for fabling the extravagancies of nature, or raising ideas of bhúts and spectres. As to the káfirs, their domiciles yet remain: desolation is not the word for this place, the surface of the hills is actually dead; no vegetable trace is to be seen, all is parched up, and as it were baked white, and scoriated by the sun's rays; such is the horrid aspect of this part of the country, to which the caves of the káfirs have added a savage impression. These are still inhabited, but their first possessors have long since disappeared; the sides of the mountains are full of excavations, presenting to the approaching traveller some thing like a honey comb; whole families occupy these recesses, living in smoke and darkness, of which they seem to form a part, in their black figures.—One of the idols is actually tenanted, and high upon the acclivity are seen isolated niches and black heads peeping forth. At night, the moving lights and yells of unseen people have a singularly wild effect, and one dwells in the contemplation of the scene, till it actually appears one of an infernal kind, fit only for such companions as bhúts and demons. Burnes took sketches of the whole.

“A Persian of our party, who had been at Moscow, had drawings of the idols, which he affirmed were an object of enquiry in that country, and that he had made them at the request of the Russians; and when they send to Bokhara for coins and other antiquities, there is nothing surprising in their extending research to Bameán. The figures appear to my eyes more like designs of Búdha than any other; their physiognomy at least resembles that of images I have seen in Kanáwar and Tibet. They are mentioned in several old books, and it is strange that any mystery should prevail about the age or events of which they are symbolical. We can however now assign them their true site and position in Hindú Kúsh, which were to us even at Kábul extremely vague, and to people in India, utterly incomprehensible. Bameán has its site upon the northern declivity of Hindú Kúsh, and within its lofty ramifications, in a dell or valley, which throws its waters into a tributary of the Oxus, that passes through Kúndúz. The map places it south of the snowy ridge.—It forms the extremity of the Kábul dominions, and is elevated a little above 8000 feet. The climate was rude and disagreeably cold on the 20th of May, and the grain crops were only sowing. An idea has prevailed that Bameán is a pass in the Hindú Kúsh, or in a more southernly ridge; but it is quite across the chain, although environed by snowy heights. On the north, at the head of the dell, the mountains are depressed to a hollow, or pass between 10,000 and 11,000 feet, and beyond that the country subsides in undulations to the Oxus.

Hitherto we had adopted no particular precautions to maintain our disguise, except evading the gaze of people, passing either unobserved, or as Armenians; but on entering Morád Bég's territory, we rolled our heads within our turbans, and this saved our faces from the scorching sunshine.

At Dwap or Doab, where Mr. Wolff was robbed, we apprehended danger, and provided an escort from a neighbouring brigand chief. In the hollow of a pass, we met a káfila of very fine horses: they were all safe, and quite unaware of their escape, as afterwards appeared. We had no idea of any alarm, but as we were descending the slope of the pass, a body of robbers appeared—they had lost their aim in the horses, and were now coming up to a couple of camels, the last remains of the káfila.—I was behind, as usual, and although I saw, I could not understand the manœuvres of our party, and kept lingering on till met by one of our servants, sent back to bid me gallop my horse. The robbers were very fair and candid, as I thought, suspecting who we were: they sent one of their party to communicate

with us, who on our side was met by a young lad, the leader of our escort, and son of a neighbouring chief, who in his turn becomes free-booter, and to these mutual interests in plunder, and partly to our force, we owed our escape. They immediately declared themselves, and their disappointment in the horse káfila, intimating with a good deal of honesty, that they ought to have had a recompense in us. Notwithstanding this result, our káfila-báshí was very assiduous in his exertions to send the baggage mules and foot-travellers out of the way. The fate of the camels and their drivers was inevitable, the latter seemed to have lost all resolution, and between fear and hope they shrieked and stood still. We were looking up from a dell, and eagerly watched for their escape; but had to witness both them and the camels carried off, the former to be sold in the public markets of Bokhára. It is this ultimate object that makes the predatory work so odious and terrific. Highway-robbery, like slave trade, when pursued systematically, loses many of its horrors, and much of its criminality, (not that I am at all countenancing either.) In fact, whenever acts become a custom of a country, self-interest deprives them of violence, and people club together for the sake of confederate advantages, frame laws of honor, and pursue their profession upon principle, and the state itself shares in the benefits of system; kasids, or letter-carriers are held sacred, the property of individuals is spared, and life is rarely lost. Many of the chieftains, such as Morád Bég, have a personal interest both in plundering káfilas, and in making slaves, and take turn month about with their feudatory vassals. Our friends, the robbers, kept within our sight, moving slowly along the top of a ridge, and occasionally reminding us of our good fortune. We were now fast descending towards the basin of the Oxus, though the country continued rugged, and now and then betrayed its altitude in hoary peaks. At last a mild wind from the north, and a haze in the horizon, announced our proximity to the plains of Tartary. The few latter marches were rather irksome, on account of the disguise we thought it prudent to adopt: the instant we reached our ground we were covered over with a heap of clothes. One morning, we found ourselves in juxtaposition to the chief of the place, a man of disrepute and a deputy of Morád Bég's: he came to dine with our káfila-báshí. We were lying amongst the long grass, and stole away a few yards, where we reposed with confident security, and listened to his conversation. Here we had troubles of a different kind, scorpions which stung our servants, and a little farther on, snakes; the heat too was already considerable, although our elevation was about the level of Subáthú (4200 feet), and our latitude above 36°; but we were refreshed with a little rain. However uncomfortable such

things may appear in a letter, in reality there was much amusement, and our most serious misfortunes (apprehensions I should say) excited an interest that was far from disagreeable ; even Morád Bég himself appeared to me a plausible enough sort of a savage. At midnight, on the 29th of May, our káfila-báshí warned us to be off: we scrambled awkwardly through a marsh, and the day broke while we were yet in the deep hollow of a torrent ; we hoped still to reach Khulm (which was to terminate all our doubts of safety) before the bazars were crowded, and finally, soon after sunrise we emerged upon the plains of Turkistán ; the pass through the mountains was between mural precipices of tremendous grandeur ; and I was so much struck with the solitude of the spot, that I conceived we might evade observation in some of the recesses of the cliffs, and escape the sun's rays at the same time, and resume our journey at night-fall towards Balkh. On opening upon the new world, the first objects, as usual, were mountains, at the base of which rolled the Oxus ; the river itself was not in the sight, but a regularly defined haze indicated its course, a phenomenon I had before remarked in the Satléj, and we ourselves had observed in the Indus, which arises from the difference of temperature between the stream and superincumbent stratum of air. We regaled our eyes with the regions of " Trans-oxiana." The respectability of our party saved us any trouble at the custom-house. We were not searched, and pushed through the streets, staring every one in the face. We entered a caravanserai full of people, and lodged ourselves amongst tea merchants, and traders in Russian furs, and people of all nations and descriptions, as if nothing had happened ; and I am not now going to waste time on the subject. Suffice it, that we found ourselves in the safe custody of Morád Bég, and after ten days rather anxious suspense, escaped from all apprehensions, and departed under his aid and protection !! How we extricated ourselves from a scene which was at one time tragic, at another comic ; contortion, trickery, and sordid interest on the part of the Nazir, to make the most of us ; fear and folly on that of others ; self-confidence and friendship in a few ; wonder, expectation, and the most stupid credulity in Morád Bég himself, and altogether a drama in which the chief actors struggled for the loaves and fishes in our pockets ; poor Morád Bég got nothing by his Oozbek simplicity, while we who sustained the whole scene were never thought of, except it was to produce more money. My part in the play was rather that of a spectator than of a performer, and might appear easy ; but I had taken an early interest in the swamps of Kúndúz and arid sands of Talikan, (as you will recollect,) the scenes of poor Moorcroft's misfortunes, and Morád Bég himself became in my eyes an object of attraction, by his savage

conduct on that occasion; and however strange it may appear to others, as I fancy it did to Burnes, our situation at Khulm only struck me in the light of an opportunity I should have of realizing former prospects, and the idea of meeting the chief of Kúndúz, either as a tyrant or a friend, was by far from the least cherished of my adventures; but I was doomed to disappointment, and for some reason or other, my sunburnt face, silvery beard (which is now black enough), and ignorance of Persian, (though Turkí is the spoken language in Kúndúz,) were supposed by the catchers of the loaves and fishes to be unfavorable to our disguise; consequently I was left behind, and Burnes alone paid Morád Bég a visit at his country seat. We had been summoned to his presence to give an account of ourselves, and to remove the suspicions which rumor had attached to our character. Neither Burnes nor I anticipated any personal danger, but the chance of restraint, or at least incalculable delay, and the certainty of a pecuniary sacrifice, or absolute deprivation of all our resources, had sufficient alarms to make both of us anxious for the result. Bad as the repute of Morád Bég was, and too surely deserved, by his treatment of Moorcroft, I could not resist the idea that we should find him better than he was described; and though poverty and power together might plead an excuse for robbing us of our money, sordidness itself could not wholly destroy the common sympathies of our nature, and make him stare forth the naked savage. The self-will of an arbitrary tyrant, enjoying a penurious chiefship, might induce him to an act of extreme rigor; but self-interest would scarcely allow him to trespass the bounds of discretion, and insulate himself from the feelings of all around him. Burnes successfully appeared before Morád Bég, as an Armenian watch-maker from Lucknow, and it turned out, that the blackest person of our party would have answered equally well; with the above simple reply, the despot of Kúndúz and king of terrors was satisfied. Could this be, amidst the game that was playing, the gold that was shining through us, promised bribes and open trickery? besides, Morád Bég had heard of us at Pesháwar and Kábul approaching with five lakhs of rupees, and the custom-house officers were looking out for us; yet all this and much more happened, and if there was no delusion, confirms the character of the Oozbeks as given by Elphinstone, for unsuspecting candor and the most stupid credulity. Burnes passed a pleasant-enough time at Morád Bég's country-seat, drinking tea all day, and eating the leaves, according to custom, after the manner of the ancients; and having been presented by an honorary investiture of some new clothes, he returned to Khulm, a distance of 70 miles, without dismounting, much better dressed than when he left it.—Moorcroft, at

the very same place, in his flight from Morád Bég, and for the safety of his life, made his remarkable journey to Talikan upon a single horse, with grain in his saddle bags; the distance, as then stated in the Government Gazette, 130 miles, seems to be excessive. Previous to this final result of Morád Bég's curiosity, we thought of escaping to Mazár; but we were watched, and this would have been a feat of senseless heroism, as we were liable to certain danger on the road from robbers. Morád Bég's courtesy and attentions to us as Armenians, in ordering an escort of 50 horsemen to see us beyond his frontier, did not allay our apprehensions for our liberty; and as the scheme, as well as ourselves, were notorious throughout the caravanserai, we made every haste, and next morning's dawn saw us on the way to Balkh. Our own people, scarce aware of our plans, had provided us but meagrely, for a ride of 30 miles under a burning sun, and I had neither clothes nor any thing else. We were now literally flying from ourselves, and the protection of a man whose very name we dreaded, and whose treatment of us is veiled in an obscurity, that leaves it doubtful, whether we at this present moment stand towards him in the relation of friends or enemies. Subsequent travellers may remove the uncertainty, which is of more consequence than appears to the eye, but in this respect our experience can prove to them no guide.

The journey to Mazár was rather trying, over a bare, baked soil, without shade or water; the temperature of the air was 100°, and that of the sun's rays much greater: my face at least was completely burnt. Our escort left us at what appeared the most dreary point of the road, and it was actually the most dangerous; our horses were wearied, and that which I rode stood still in a place where our káfila-báshí said it was imprudent even to look around us. We entered Mazár unknown and unsuspected, and it was perhaps fortunate, as the people are intolerant bigots and disreputable in every way. Piles of snow, and the most delicious apricots were in abundance. It was here that Moorcroft's property was seized and plundered: we felt extremely anxious to ascertain if any papers or memorials still remained, and the fate of his books, which we heard were in the possession of the chief; but prudence constrained us to pass over the scene in silence.

We had here a contention with our guide, who enacted a scene on the occasion, partaking at once of the pathetic and the furious.—Burnes was fortunately on horseback, and had the whip hand in case of necessity—I mean, the advantage of escaping from an irritated Muhammedan, who had only to proclaim us infidels and revilers of the prophet, and there would have been tragedy indeed.

Thus terminated our intimacy and connexion with the man, to whose care and protection we had been consigned, by the brother of Dost Muhammed Khán, for our safety to Bokhára; we never spoke again. The Syud, Mr. Conolly's friend, whom we met at Pesháwar, and whose grateful feelings for the attention and liberality of the Governor General had interested him in our journey, to the extent of promising to protect and conduct us to Bokhára, we left at Kábul, ill, and otherwise too much engaged in his own affairs, to assist us in any way. Thus deprived of the dependence we had in these people, and without any introductory letter to the king of Bokhára, (the Nazir having lost or wilfully destroyed it,) we had to make the best of our way unassisted.

On the road to Balkh, we turned aside to see poor Trebeck's grave. Muhammedan bigotry had yielded so far, as to permit his remains to be deposited within an enclosure or garden: a mulberry tree sheds its fruit over the spot. We had heard this young man spoken of every where with the highest eulogies, and it was a satisfaction to us to have visited his lone sepulchre. We wished to leave some record of the spot, but although it is possible to get a slab-stone here for his and Moorcroft's graves, it is doubtful how such a memorial would be respected, unless we ourselves had witnessed its erection.

On entering Balkh, we were met by two custom-house officers, jolly fellows, and one of them a Túrkomán; but from the nature of their employment, rather boisterous and abrupt: they stopped our horses, bade us dismount, and said we must be searched. A little surprised, we kept our seats, and assured them we were not merchants. "We must see what is in those saddle bags," said they. Burnes then dismounted, and the Túrkomán began an examination of his person, passing his hand over his watch—what have we got here? Ah "Saat," that is a useful article to travellers—very well, have you got nothing else, no tillas (gold coin), and before Burnes could reply, he with much good humour said, Come, come, you know as well as I do, that people cannot travel without money; now, how many have you? Twenty, said Burnes, offering to untie them from his waist. Don't trouble yourself; there is no occasion, Your word is everything, I am satisfied; and pointing to me, (I had not dismounted, and was thinking what to say,) what has your companion?—the same. Thank you, replied the Túrkomán, you are gentlemen. I wish every one was as ready in their answers, they would save themselves and me much unnecessary and awkward trouble. Your names, said he. Sikandar Armení and Gerard (with the French pronunciation). The tax upon our money was a tenth. Hindús pay a twentieth; and Muhammedans, a fortieth. We had no tillas except those tied about us; but

the Túrkomán said, Make yourselves easy, I'll call upon you at the caravanserai. Such civil treatment, in such a country and by monstrous Túrkománs, deserves to be mentioned."

"We were now in the most ancient and renowned city in the world, and when we looked at the ruin and recalled to mind, the dynasty of Bactria, and in later ages the thrones of Jenghiz and Tymúr, with the neighbouring scenes of Bokhára and Samarkhand, the present and the past, it gave us a lively idea of the countless revolutions which had rolled away. There was nothing here by which we could recognise these memorable epochs, and judging from the aspect of the few inhabitants left, the spot seemed more suited to the dead, than as a place of abode for the living. The ruins, which are mostly of mud, are very extensive; but they only mark the modern site of the city. The insalubrity of Balkh is proverbial, and this calamity may be traced to the very effects of its former greatness. The eighteen beautiful aqueducts, by which it was irrigated, no longer guided by the art of the husbandman, have spread their waters over the face of the country, and transformed its fair landscape into a stagnant marsh. Here the Nazir had another opportunity of resuming his tricks: in our difficulties with Morád Bég, we had intrusted him with our passports; and forgot them at Mazár. He now pretended to have lost them, and we were preparing to visit him *vi et armis*, when the intercessions of our Hajee restored them without more acting. From Balkh to the Oxus is almost a desert; camps of Túrkománs occur in some places, and the sand hills are well clothed with bushes. The high road was considered unsafe, and we followed the downward course of the valley. At one spot only we required an escort of Túrkománs, who are themselves the robbers, but find it more advantageous to compromise their habits by an easily earned recompense. They were the first of the race we had seen, and their peculiarities struck us with surprise and interest. Their features, their dress, address and gay agility upon horseback, were all favorable; and, in fact every thing about them, but their modes of life and predatory customs, were respectable. On the 15th of June after travelling twelve hours, the day dawned upon the shores of the Oxus, and at nine o'clock, we were encamped upon its margin; a point that had so long been in prospect, and glimmered through so many vague and ill defined ideas of difficulty and peril, was now at our feet, and we were not satisfied till our feet were actually in its cool waters; and here we sat, slept, and passed three entire days, with more ease than we dare expect upon the banks of the Ganges, for here we had neither alligators nor enemies of any kind to dread.

The Oxus is a splendid river, here exhibiting an expanse and volume fully equal to our expectations, or its appearance as given in the map; but I should say of inferior magnitude compared with the vast extent of country of which it is the drain, and where deserts and arid mountains occupy so large a portion. The Hindú Kúsh generates but a scanty tribute from its snow, and but few supplies are derived from the north; the great body of the water coming from the south-east and east, where the intersections of the Himalaya define the course of the streams to the Indus, and branching northward, give origin to the rivers which wash the Chinese frontier of Yarkúnd and Kashghar, the whole of which tract from the limit of Kundur in one direction, and Bokhára itself in another, is a blank in geography. It is true the sources of the Oxus are pretty well ascertained, and the travels of Meer Izzat Oolla have sketched the configurations of the country north-west of Ladák; but the height, extent, and nature of the mountains which intervene between Leh and Yarkúnd, and along the north-west branches of the Indus and Hindú Kúsh, are wholly unknown.

The stream of the Oxus is muddy, like that of our Indian rivers; but confined within marginal banks bearing a stiff vegetation, it has a more regular channel, and rolls with greater rapidity; where we crossed it, the expanse of bed was divided by islands, and the current assumed various degrees of size and velocity, the largest with a rate exceeding three miles per hour and a depth of 20 feet. As no rain falls in this country, the whole mass of water is liquified snow. It is impossible to form a comparative estimate of the actual bulk, but it can scarcely equal the Indus at Attok. The ferries are ill supplied with boats, but the boats themselves are substantial fabrics, and are built more after the model of our sloops than any thing I have seen in India; but the people have no idea of navigation; their oars are of the rudest kind, only one or two in a boat, but the chief impulse depends upon horses, which are fastened on each side of the bow, and, by their exertions to swim, drag the boats across the currents. I never heard of such a practice, and almost doubted it till we witnessed the spectacle. There are no fords downwards to its debouche in the Aral, but in winter it freezes over in several places, sufficiently strong to bear the transit of the káfilas, which is singular in a parallel of latitude under 40 degrees, and at a very inconsiderable elevation.

The bed of the river, where we crossed it, scarce attains the level of the Punjáb rivers, in the line of our route, as well as we can estimate by the boiling point of our thermometers, which are the only means left us. Prinsep, in a letter to Burnes, reminds us of this resource (in the absence of barometers), to verify the levels of the Aral and the Caspian; but this

method (at least with common thermometers, where the divisions which are so small, answer to so large an equivalent) is scarcely appreciable to the extent of 200 or 300 feet, which those land-locked seas are supposed to be depressed below the surface of the ocean. In this dry climate, the horary variations of the barometer would amount to more than the above quantity, but we shall lose no opportunity of using every means to confirm so curious a conjecture, if it is not already settled. From the Oxus to Bokhára is more or less a desert tract, and the surface of the soil undergoes every modification of barrenness, from the hills just sprinkled with vegetation, to the hard-baked floor and dead sand heaps. The first four days no villages but camps of Túrkmans were passed. The water was either salt or saliferous, and owing to our folly in trusting to information which is in its nature imperfect, as the springs of potable water are as variable as the sand hills, we suffered excessively from thirst, the sun raged with a burning heat, and we had no defence against it but our clothes. The wind of the desert dried* us like parchment, but the nights were cool, and often cold: this however did not take place till towards day break, and the few hours sleep we then got were deliciously refreshing, after heaving up and down upon a camel's back all night. The face of the country was very uneven, almost hilly; we at last came to waves of pure sand which were said to shift their position, like those in the African deserts, and we eagerly looked out for the moving heaps; but all

* "In the journey from the Oxus to Bokhára, the mean difference between the wet bulb and the temperature of the air was upwards of 20° , the extreme difference often 34° and 35° , and the least 10° or 11° , but in Calcutta during the same month (July) $3^{\circ}.5$ is the mean difference, and $5^{\circ}.5$ and 2° the maximum and minimum." At Benares, according to Prinsep, the difference between the wet and dry bulbs is sometimes 37° in the hot season. Bokhara seems to be drier in July than Calcutta is in January:—can July be the driest month at Bokhara, when the cold season appears to be driest in other parts of the world? If the cold weather is driest here in winter, the evaporation must be astonishing, which will account for the excessive degree of cold in so low a latitude as $39^{\circ} 43'$.

"The evaporation from a cup can be easily measured by a scale: I found it more than once amount to two inches, in 24 hours, the thermometer being from 72° to 104° in the open air; in the shade, since entering Túrkmistan, the highest has been 110° , and the lowest 54° , which occurred in the desert. In so arid an atmosphere you may suppose we do not complain of heat, although the thermometer is every day 97° and 98° in the house, and the more one perspires here the colder one becomes. It is owing to the hygrometrical state of the air, that we see ice made when the thermometer is above 50° , and by increasing the aridity, ice might be made at 70° : in fact a difference of 37° is nearly that in the driest months here, we ought therefore to expect ice with the thermometer at 80° . This great aridity will account for the state of our feelings, the formation of ice, preservation of meat, drying of fruits, cold, vegetation, and many other phenomena."

I could believe of such an occurrence, and which I saw, was the currents of loose sand raised from the surface by the wind, or blown from one place to another, the heaps themselves being immovable *en masse*. At Karshí, which the map places full half way, we were seized with fever, no doubt from the swamps of Balkh or the miasms of the Oxus. Burnes was first taken ill (some days previous), and here I and two of our party with a tea merchant followed, and as I delayed treating myself as doctors usually do, it was not until I had been a week in Bokhára, and after quantities of quinine, that I recovered, but the poor merchant died. He was an intelligent and agreeable companion, and the few days we were together in the desert left the impression of a long period of friendship. In our situation we become acquainted with individuals who, wiser in local experience than ourselves, entertain us by their adventures, and from whom we separate with regret. The fate of this man, out of so small a party and in so short a time, was a matter of some reflection to us, who were even more liable to the effects of climate and the fatigues of travelling ; it shewed us that without any dangers from robbers, tyrants, or intolerant bigots, our health was sufficiently precarious, to make such a journey of doubtful success ; and though the chances of adventure did not allow us to consider any thing a real hardship, yet on looking back, we saw ample reason to consider ourselves fortunate in having so well overcome the trials we were exposed to.

I had almost forgotten to mention that we paid a visit to the desolate grave of poor Moorcroft at Balkh. It was a bright moon-light night, and our Hají, who attended his remains to the earth, showed us the way to the spot, which lay amidst marshes, and I could not help thinking that these very marshes had caused the melancholy event. We were surprised to hear that the severities of fortune, which accompanied Moorcroft's career from the beginning, had pursued him even beyond the grave, and that a burial place was barely permitted to his remains, upon the skirts of the city and on the outside of a garden wall. The spot is retired, and had we not been guided to it, by one who had witnessed the interment, we might have searched or inquired in vain for the site. We were unprepared for such a spirit of odious prejudice as seems to have prevailed against this lamented individual, for the same feelings did not exist in regard to Mr. Trebeck. Mr. Guthrie's body is contiguous. Those solitary receptacles have for the first time been seen by an European eye, and remote as they are from friends or countrymen, they are nevertheless unmolested, where they themselves, while living, had gained by their praise-worthy conduct, a respect and remembrance that will long be cherished in Turkistán ; and if they encountered some tyrants and wretches in their long travels, they met with many friends and well-

wishers, and have left the name of Englishman with all the honors which we most covet. At Karshí we had a specimen of the gardens which poets have celebrated in their descriptions of Samarkhand and Bokhára; we lay amidst apricots and ice, and I enjoyed both in spite of an ague that almost shook me to pieces. We heard of slaves for sale here, and a young Hindú of our party, a clever and promising lad from the Delhi institution, whose thirst for knowledge leads him into many strange situations, has the following dialogue in his journal about the traffic. It is headed "a trick or jest for a slave girl," and I extract it literally.

"On my return from bazar I besought a man to shew me the house of the merchant who sells men and women, which I reached after traversing very hot streets. The merchant received me civilly, and sent for three women from a room adjoining to that which was his own. He told them to sit before me, and then inquired of me which I liked to buy. I replied to him, the young one, who had regular features, was mild and attractive, her stature elegant, though below the middle size, while her wit and vivacity exceeded even her allurements. In the mean time the two others, who were neither ugly nor beautiful, stood up and went into their rooms; the young one followed soon after, but sat in a separate place, guarded by a very old man. I was told by the merchant to go in the same room, to speak, to laugh, and to content the girl. I sat out to the girl, and conversed in the following manner. I love you and like to buy you, art contented and pleased with me? She smiles and says, No, I do not like you, because she is afraid perhaps I sell her to another after enjoying my own gratification: her name was *Gul-sad-barg*, (the flower of a hundred leaves.) After much altercation, she says, Very well, I should swear not to sell her again and make please to her master. The old man who sat by the door told her to stand and to show me her whole body according to the custom, which means perhaps that there be not any sort of disorder in her person. All her body was crystalline, her age was 13 or 14 years. I talked with her a long time on various subjects, inquiring her nativity and birth; she said her home was in Badakhshán, and she had a large family: she was ravished by the ruler of the country, and sold to this merchant. On saying this she brought a flood of tears in her eyes, and said, For God's sake buy soon, and release me from the hands of this unmerciful Uzbek. It made me very sorry: I cursed the ruler, and bestowed a malediction on her merchant who troubles her. I instantly got up and came away to my camp, without seeing or telling any word to the merchant, as I had not inclination to buy her. The experience and fun induced me to make a trick for investigating the principles of slave merchants,

who I say are very miserable, criminal, savage, and unmerciful men indeed."

At this place a conspiracy was attempted to be formed against us by a Persian of our *káfila*, a man of consummate address and knavery, and rumours were afloat that the king of Bokhára had interdicted our entering his capital; but the extravagance of the plot almost betrayed its falsehood: however, considering the influence and conduct of the *Názir*, who was the bosom companion of the Persian, and with no other voucher of our character but our passports, we did not like the circumstances, though they scarcely made us uneasy. The remaining four marches to Bokhára had less of the desert in them; the undulations continued; also sand and salt-water. Sometimes the true and unlimited horizon was spread before the eye; at last, on the 27th of June, we arrived in this fine city, which had a few months before appeared so remote and uncertain. I have written so much that you must not at present expect any account of this ancient place. The transit of letters from this is very uncertain, and to give them a chance of safety from the *Allemáns* (robbers), and even the *Khybarís* near *Pésháwar*, we must fold them in the native fashion. The usages of the Muhammedan government are here extremely strict, and the precepts of their religion are fulfilled with awful rigor; we are not likely to come under any of the penalties, except, indeed, we are seen drunk in the streets, or smoking publicly, neither of which there is any chance of; but we might certainly have committed ourselves in regard to dress, which for all infidels is strictly defined and peremptorily imposed, and if we are naturally obnoxious to their sight, our dress adds to the spectacle. A black cap on our head and a rope round our waist, are particularly interesting; for we have only to pull the cap over our face and put the rope about our neck, to make us really a spectacle! We are allowed to reside in a private house after some little remonstrance; a public *sérai* is our proper dwelling place. We cannot ride within the walls of the city, and must push our way through the densely-peopled streets, which detracts considerably from our interest in the scenes of the bazar, and in our walks in an atmosphere so warm and dusty. *Moorcroft* was permitted to ride, but he was in character, and brought presents for the king and his courtiers; but this privilege was only granted on condition that his Muhammedan syces should accompany him mounted, as they could not be seen on foot attending an infidel on horseback. We have no character at all to support, except it is that of *faqírs* or beggars (not religious mendicants). The garments of all other unbelievers are similar to those in which we are accoutred, such as *Hindús*, *Armenians*, and *Jews*, and

these last we especially resemble in every thing except their features. The restriction we feel most is being unable to write, but this is more our fault, or our courtesy, than any actual prohibition of the state, for as we can elude suspicion by writing at night, it is only the chance of detection that prevents us taking up our pen in the day time. As I cannot see well by lamp light I shall not attempt making a single note, and by the time we leave this I shall remember nothing to write about. I have seen the minister, Ghós Bégi, once : he is a curious old man, and very fond of decorum, though without state or show in himself. He is always finding fault with our dress or posture in sitting ; and this last is no easy matter, although we have been trying it for six months past. With all the Bégi's shrewd penetration, he seems to be at a loss what to make of us.

Upon the whole, our reception at Bokhára, if not remarkable for distinction (except indeed that regarding our dress), or favors (neither of which we had the least claim to, and I at least had no expectations of), has been sufficiently respectable and civil ; and with the people, whether in the crowded bazars, in public sérais, in private converse, or in the mosques, our name and country have been a recommendation instead of a pivot for insult and ignominy ; and this too in a city notoriously orthodox in religious duties, and where Muhammedan principles of every kind are fearfully arbitrary. We have not heard the epithet of *káfir* from one end of our journey to the other, and only at one place, near Attok, some boys used the expression of monkeys. Wherever we have gone and appeared as Europeans, that character has been respected ; and we may depend upon it, that the name of Englishman, whether this is understood by *Feringi* or *Angrez*, if assumed with discretion, is our best passport.

We have no chance of seeing the king, except in the open streets with the rest of the mob : the rascal of a Názir has played us this trick. Dost Muhammed's letter would have done us a service. The bazars here are splendid, and the police regulations admirable. Bokhára is a large and populous city, eight miles in circuit, and exceeding any we have met with in our journey. There are many fine colleges and other buildings ; the Uzbeks are a handsome race, but the Jews, (more especially the Jewesses,) carry off the palm of beauty. There is more religion, more law and justice, and more crime, than in any place of equal size in Asia ; but property and life are safer than in most cities in the world, whether civilized or savage. The people here are much more familiar with the Russians than with the English, and another Russian embassy is soon expected at Bokhára. People from all parts of the world

except China are seen here. Every body drinks tea, generally after our fashion, but without milk ; there is a kind of tea called *banka* which comes viâ Russia from China ; it costs 10 rupees, and is very fine flavored, and it is said that a sea voyage injures it.

The *banka* tea goes from China to Russia by a direct road, avoiding Yarkúnd, as by being packed up in small canisters it will not bear export by the mountainous route, and by coming here from Orenburgh it thus attains a very high price ; the tea trade is immense. We first saw loaf sugar at Khulm, and it is the same as we have at home. Many people in Bokhára wear watches, all of London mechanism. In the Bazar we see tea urns with the red hot iron in the middle to keep the water warm, and many things remind us of Europe.

We have tried horse's flesh, and having beef at the same time, we gave the preference to the former ; but whatever Elphinstone says about horse's flesh being the food of any part of the people, it is at least very rare, and beef is far from frequent.

The climate, that eternal subject, is warmer than is agreeable ; in fact it is sultry, but dry, and otherwise delicious, the sun shining out his entire course, and not a cloud in the air. How very different from India at this season ! The nights are generally cool, but we find sleeping in the air necessary for comfort ; the usual range of the temperature outside is from 74° to 103° , rising to 106° in the streets : we loathe the air in a room heated to 96° and even 110° , and, although sitting quietly, we feel it rather disagreeable ; but in so arid a climate, the sensation is less oppressive at this degree of temperature, than at 80° in India, at the same season. The most singular part of the climate is the intense cold of winter, which freezes such a stream as the Oxus. The blocks of solid ice in the bazars here indicate the severity of the weather, and can only be explained by the extreme dryness of the air.

There are disturbances at Urganj, and their army has marched to attack the Persians on the line of our route ; we therefore know nothing of our prospects : but it strikes me we shall be forced to take the road to Meshid. Burnes and myself are now quite recovered. I have received no letters since the middle of March, and the only dawkh which has reached us since crossing the Indus, we got at Khulm, and by it came Nos. 1 and 2 of the Journal of the Asiatic Society ; it will please the Editor to know, that his work spreads itself over such distant regions. I have picked up some coins here, bearing Greek inscriptions and heads, and something like masonic insignia upon a small axe ; but I am too distant here to venture to send the originals, though I may impressions."

Bokhára, 15th July.

II.—On the Manufacture of Saltpetre, as practised by the Natives of Tirhút. By Mr. J. Stevenson, Supt. H. C.'s Saltpetre Factories in Behar.

The soil of Tirhoot almost every where contains a large proportion of saline matter, such as nitrate of potass (saltpetre), nitrate of lime, sulphate, and muriate of soda, &c.* but in general the sulphate of soda is most abundant. The saltpetre (as well as the other salts) lies in patches as it were, some parts being more productive than others, according as carbonate of lime and sand alternately predominate. By analyzing the different soils, I have found those places most productive of nitre to contain a redundancy of the former; and on the contrary, where the soil was unproductive, I found a redundancy of the latter substance. I am therefore naturally led to the conclusion, that carbonate of lime is one of the principal agents in the formation of this article. This will also account for the district of Tirhút being more productive of nitre than any other place in India, for almost half of its soil is calcareous; an average sample of it, collected from various places where saltpetre abounds, and carefully analyzed, gave me the composition as follows. 100 parts being operated upon.

Matter insoluble in the three mineral acids, Silix,	50.0
Matter soluble in ditto, Carbonate of Lime,	44.3
Matter soluble in water,	{ Sulphate of Soda, 2.7
	{ Muriate of do. 1.4
	{ Nitrate of Lime, 0.9
	{ Nitrate of Potass, 0.7
<hr/>	
100.0	

This analysis does not agree with Dr. John Davy's, but be it remembered, that scientific gentleman operated upon saltpetre earth from the factories, which of course contains more saline matter than the general soil.

In the month of November, the *loneahs* or native manufacturers of saltpetre commence their operations, by scraping the surface off from old mud heaps, mud buildings, waste grounds, &c. where the saltpetre has developed itself in a thin white efflorescence, resembling frost rind. This saline earth being collected at the factories, the operator first subjects it to the processes of solution and filtration. This is effected by

* I have not been able to ascertain whether the *sajji matí* (native carbonate of soda) is found in this district; as far as my own observations have extended, it does not form a part of the composition of the soil. I also could not detect any alumina, though it is likely some parts may contain it.

a large mud filter, lined on the inside with stiff clay. It is a round hollow basin, in shape resembling the top of a well, from 6 to 8 inches in diameter. A false bottom is formed of pieces of bamboo, laid close, and resting upon pieces of brick. This leaves an empty space of a few inches above the solid bottom, for an outlet to the filtered liquor. Over these bambús, a covering of strong close wrought grass mats are laid, which complete this simple form of filter. The operation then proceeds with the process, by spreading over the mats a thin layer of vegetable ashes, generally from the indigo plant, upon which the earth to be subjected to the filtering process is laid, and trodden down level, and to the desired solidity, by the operator's feet. This requires great attention on the part of the man who performs it: for if too solid, the water will pass through too slow; on the contrary, if too soft, the water will pass through too quick; for the solution of the saline matter to take place, and the full products would not be obtained. After this point has been adjusted, water is poured gently upon the earth to the depth of four or five inches, according to the size of the filter and quantity of earth used, (one of six feet diameter will filter 20 maunds of earth.) The whole is then suffered to remain tranquil for several hours, during which time the water gradually passes through the earth, dissolving the saline matter in its passage, and filtering through the mats, drops into the empty space between the solid and false bottoms, and is conveyed by means of a spout of bambú, or a hollow tile, into an earthen receiver, made large enough to hold the full quantity of filtered liquor, and half sunk in the ground for the purpose.

The saltpetre liquor thus obtained is more or less coloured with oxide of iron and decomposed vegetable matter. Its specific gravity also varies with the quality of the earth operated upon. An average from a great number of filters gave me 1.120.

The second process is to evaporate the saltpetre liquor to a crystallizing state, which is effected in earthen pots fixed in two rows, over an oblong cavity dug in the ground, the interstices between the pots being filled up with clay. An aperture at one end of the cavity serves for an egress to the smoke; another at the opposite end is used for the introduction of fuel, which is generally dry fallen leaves gathered from the *ám topes* (mango groves): such are the simple materials used in this part of the manufacture. The boiling is continued till the liquor is evaporated to the crystallizing point, which is ascertained by the operator taking from time to time a small portion of the liquor from the pots, and setting it aside to cool in small earthen dishes, like a common saucer. After the liquor has cooled, and the crystals formed agreeable

to the practice of the operator, the fire is stayed, and the liquor removed to large shallow earthen dishes (which are used instead of crystallizing coolers), placed in rows, and sunk to the brim in soft earth. At the end of about 30 hours, the process of crystallization is finished. The crystals of saltpetre are taken out of the coolers, and put into baskets to drain, after which they are removed to the store-house, ready for sale.

During the operation of boiling, it occasionally happens that too much heat has been used, and the pots are in danger of boiling over. To prevent this, the operator has a very simple remedy, which our more scientific operators might not be ashamed to take a lesson from—a bunch of dry jungle grass is fixed at a right angle, to the end of a stick; this is dipped into the liquor, and held up over the pot, and the liquor, which it had absorbed, falls down in a shower (cooled by the air) into the vessel it had been taken from. The temperature being thus reduced, the evaporation proceeds more steadily, and the accidental boiling over is prevented. The mother liquor, remaining after the crystals of saltpetre have been removed, is returned to the evaporating pots, and mixed with a fresh portion of the liquor from the filters, for a second boiling, and crystallization. The extraneous salts, such as sulphate and muriate of soda, which the filtered liquor from the earth always contains, are partly found at the bottom of the pots, (the muriate of soda in particular,) and partly in the mother liquor, remaining after the process of crystallization. But to separate them more effectually, the manufacturer passes the liquor from the boilers through a piece of coarse cloth, placed in a basket; and when the liquor has drained through, the greater part of the extraneous salts are found on the cloth. To do this effectually, it is necessary, that the liquor should be at the boiling point, otherwise the saltpetre liquor would not leave the sulphates and muriates, but would form an anhydrous mass.

The muriate of soda, or common salt, is rendered more pure by a subsequent boiling. It is then called by the natives *pakwa nimak*, and is sold in the bazars as an article for culinary purposes. The remaining extraneous salts—sulphate of soda, nitrate of lime, &c. are returned to the earth, to undergo a change by decomposition against another season. The *nitrate of lime* is decomposed by the *carbonate of potass*, which the vegetable ashes, used in the process, contain. When solutions of these salts come in contact with each other, a mutual decomposition takes place. The *nitric acid* of the lime combines with the potass, and the *carbonic acid* of the *potass* combines with the lime. Thus two new salts are formed, viz. *nitrate of potass* (saltpetre), and *carbonate of lime*. In this manner, the old earth, which has already produced saltpetre, is regenerated, and rendered productive against other seasons. The native

manufacturers are aware of this fact, but not being able to account for it on scientific principles, they say, that *saltpetre generates or develops saltpetre*; but I dare say that most scientific men will concur with me, that the above idea of the natives is next to a physical impossibility. Owing to the porous nature of the earthen crystallizing vessels, a part of the saltpetre liquor oozes through the bottom, and is absorbed by the earth on which the utensils are placed, occasionally they are broken, and the contents of course falls into the earth below. This earth is again subjected to the process of filtration, and the practice of the manufacturer, in order to obtain what had been wasted in the above manner. Thus the *loneahs* proceed from season to season, without the least deviation or alteration in their manufacture. No persuasion, however reasonable, by way of improvement, will cause them to alter the plans which their forefathers had in practice; and it is probable, that the methods used at present were the same three thousand years ago.

The saltpetre obtained in the above manner, which I have attempted to describe, is a very impure article, termed by the natives *dhoah*, and is sold at the rate of from two to three rupees a maund. It generally contains from 45 to 70 per cent. of pure nitre. The following analysis was tried from an average of several hundred maunds of what was stated to be of good quality, and brought three rupees eight annas per maund. 100 grains operated upon.

Insoluble matter, sand, and mud,	5.0
Sulphate of soda,	9.1
Muriate of do.	8.0
<hr/>	
Total impurity,	22.1
Nitre,	77.9
<hr/>	
	100.0

This may be taken as a fair sample of the quality that the *loneahs* produce in general, but when it passes from their hands to the saltpetre merchants, it is frequently adulterated with sand, mud, and dirty salts of various kinds, to such a degree, that it scarcely contains 50 per cent. of pure nitre. A sample of this adulterated article from 15,000 maunds gave me the following result:

Insoluble matter, sand, and mud,	22.7
Sulphate of soda,	23.8
Muriate of do.	4.2
<hr/>	
Total impurity,	50.7
Nitre,	49.3
<hr/>	
	100.0

To produce the article called by the natives *kalmee* (crystallized in long prisms, meaning the best kind of saltpetre), the *dhoak* is re-dissolved and crystallized; the percentage of nitre will then amount from 85 to 95, pure; but this is only done by the opulent native merchants who supply the Calcutta bazar.

In conclusion, I have only to observe, that the above methods of manufacturing saltpetre, used by the natives of this country, although rude, yet are very simple, and more effective than most of our scientific chemists, at first sight, would suppose. No manufacture in Europe can equal it in point of cheapness and simplicity; and when it is considered, that these simple people have no knowledge whatever of chemistry as a science, it is surprising how well they manage to make the rough article. At least, such were the ideas that struck me during the many hours (and I may add pleasant ones) that I have spent in observing the simple, but not altogether ineffective, plans and operations of this industrious manufacturing people.

The above notices claim no merit, except that of truth. They are the result of observations and notes taken on the spot, during a residence of two years in the district of Tirhút; province of Behar.

Tirhút, 7th December, 1832.

IV.—*On the Greek Coins in the Cabinet of the Asiatic Society.*

By James Prinsep, Secretary.

Having in the first volume of the JOURNAL described the Roman Coins of the Society's Cabinet, with such explanations as might, I hoped, be of use to those who were untutored in the mysteries of numismatology, so that, by the aid of the drawings, they might be able to recognize the type of Roman fabrication in any antique specimens which they were likely to discover on the continent of India, I now propose to follow up the subject, as promised in my former paper, by extending my examination of the Society's Cabinet, through their series of Greek and Persian coins, (leaving the Indian Coins for a future occasion;) and I believe that although the specimens of the two first are far from being numerous in our collection, still the drawings of them will be found sufficient to furnish tolerable guides for the assistance of the student in discriminating the coins of these countries at different periods of their history.

I cannot say how many out of the whole have been found in India itself; many on the contrary appear to have been brought from Persia.

Both Grecian and Persian coins however are met with frequently in India, and it is very easy to know them when once their forms have been presented to the eye. Several were brought by Col. Wilson from Persia, who kindly permitted me to take drawings of them; Lieut. Conolly obtained a few in his overland journey to India: and Lieut. Burnes has favored me with one or two specimens of a number of coins collected by him in Ancient Bactria, a country but recently opened to the investigation of the antiquarian.

It is from this unexplored part of Asia that we may confidently expect a multitude of Grecian antiquities gradually to be developed. Travellers of all nations are already flocking thither to trace the steps and discover the monuments of Alexander's Indian conquests. The most successful in this interesting line of research, partly from the advantage of his rank in Maha-raja Ranjit Singh's service, has been General Ventura, who, imitating Belzoni at the Pyramids of Egypt, instead of conjecturing and speculating upon the origin of the celebrated *Topé* or mound of *Manikyala* in the *Punjab*, set boldly to work in 1830 to pierce into its solid mass by digging. He was rewarded by the discovery of numerous coins and other relics which had lain untouched for perhaps twenty centuries*. A Russian antiquary I understand had previously amassed a vast collection of Greek coins in the same country. But it is by no means in the *Punjab* alone that we are to look for antiquarian riches: the north-western provinces of India offer as large a field of enquiry—and if the coins of Kanouj and Oudh are less interesting from the nature of the characters in which their legends are graven being wholly unknown, they should nevertheless be regarded as more curious because they speak this unknown language and remain the only records of kingdoms and revolutions whose existence is but faintly discernible on the page of history.

It is principally to instigate those who have opportunities of forming collections in the upper provinces, that I have drawn up these notes, and I cannot adduce a more powerful motive for studying and searching, than the example and success of that indefatigable investigator of history and antiquity, Major Tod, who thus describes his method of forming a collection in the 1st vol. of the *Trans. Roy. As. Soc.*

“For the last twelve years of my residence in India, (amongst Mahrattas and Rajputs,) the collecting of coins as an auxiliary to histo-

* An account of General Ventura's operations was communicated to Col. James Young and by him printed in the newspapers of the day: it is reprinted in the seventeenth volume of the *Researches*, page 600.

ry was one of my pursuits: and in the rainy season I had a person employed at *Mathurá* and other old cities to collect all that were brought to light by the action of the water while tearing up old foundations, and levelling mouldering walls.

In this manner I accumulated about 20,000 coins of all denominations; among which there may be not above one hundred calculated to excite interest, and perhaps not above one-third of that number to be considered of value: but among them there is an *APOLLODOTUS* and a *MENANDER*, besides some rare medals of a Parthian dynasty, probably yet unknown to history."

The coins of Greece are divided by numismatologists into two principal series: the civic, and the monarchical. The former comprehends all the moneys of the different states of Ancient Greece, bearing the names of their cities and people, and the symbols and devices emblematical of them, or the figures of the tutelary deities under whose especial protection they considered themselves placed. The monarchical series begins with the Macedonian dynasty, or about 500 years before Christ, continuing throughout the kings of Macedon, and, after the division of Alexander's empire among his generals and successors, subdividing itself into the several branches of the Seleucian or Syrian, the Egyptian, the Bactrian, the Parthian and Armenian dynasties; besides, which may be enumerated the Pontine kings and several of minor importance.

The civic coins, of which the Hunterian Cabinet at Glasgow contains so magnificent a collection, are generally supposed to be more ancient than the monarchical series; they are mostly of ruder fabrication, but the figures of animals and gods are sometimes executed with great skill: the period of the highest proficiency in the arts is, however, universally acknowledged to be the age of Alexander, or the third century before Christ: the coins of this distant age, even the meagre and scattered specimens which we have picked up in India, are so exquisitely finished as to furnish models to artists and sculptors of the present day, while they almost defy their best powers of imitation.

The inscriptions found upon the earlier coins are generally the rude initials of the names of cities or people, becoming more complete as we descend in the series: the names of chiefs or principal men and priests are introduced sometimes at a later period, but as no dates are given it is impossible to assign any exact age to most of the civic coinage. Throughout the Macedonian series the names of princes are introduced, and history affords chronological data for their classification. The inscriptions are generally written in straight and parallel lines, differing in

this respect from the legends of Roman coins which are peripheral, as are those of the imperial Greek coins, which are merely translations of the latter.


It has been urged that the Greek coins although inferior to the Roman, because they afford no record of important events or of dates to assist in the elucidation of history, yet have an intrinsic value of their own, from the service they have rendered to Geography in preserving and exhibiting the names of a multitude of cities and colonies, and by the frequency of their occurrence, or by their superior workmanship, throwing light upon the relative importance of states. Other local peculiarities are marked by the devices they bear, the origin of many of which is easily traced in the history or mythology of this classical nation : thus, the emblem on almost all the coins of Athens is an owl, the bird of Minerva : for Corinth, we have, according to Pinkerton, the winged horse : a wolf's head for Argos ; a bull's head for Bœotia ; a minotaur's head and the labyrinth for Crete ; a horse's head for Pharsalia ; a lion for Marseilles ; a tortoise for Peloponnesus ; a sphinx for Scio ; three legs joined for Sicily ; a horse for Thessaly ; a crescent for Byzantium, the origin of which deserves mention from its having since become the badge of Mohammedanism. When Philip of Macedon besieged the place, and was going to storm it in a cloudy night, the moon shone out and discovered his approach, so that the inhabitants observed and repulsed him. The Turks upon entering Constantinople found this ancient badge in many places, and *suspecting some magical power in it*, assumed the symbol and its power to themselves*.

The general demonination of the silver money among the Greeks was the *drachma*, or eighth part of an ounce, which according to Pinkerton was about ninepence, or a penny more in value than the *denarius* : from the *drachma* were derived the half, double, and quadruple, or *hemi drachma*, *didrachma*, *tetradrachma*, &c. The smallest silver coin was the *obolos*, but that was also, and generally, a copper piece.

After these few introductory remarks I will proceed to notice the coins in our possession, beginning with those of the

Greek Cities.

Plate I. Fig. 1. A silver coin in the Society's Cabinet.

Obverse. A lion walking with head erect. Double triangular symbol  and stars,

Reverse. Jupiter sitting. Legend illegible ; *tetradrachma* : weight 250 grs.

* Pinkerton, i. 241.

The lion occurs but seldom on the coins of Greek towns in the Hunterian collection, and no where with the obverse of Jupiter. It is found on the coins of Messana in Sicily, and Velia in Italy (TEAHTON); also in some of Smyrna but by the figure of Jupiter it is more probable that this coin belongs to the Alexandrine series.

Fig. 2.—A silver coin, brought from Persia, by Col. Wilson.

Obverse. Head of Minerva with helmet, facing the right.

Reverse. Pegasus flying towards the right.

It is impossible to say, for want of letters or signs, to what town this coin belongs. Many used the same devices, as Leucas, Cleone, (Hunter 100,) Corinth, &c.

Fig. 3.—A silver coin, belonging to Col. Wilson.

Obverse. Man astride upon a dolphin.

Reverse. Man riding on a horse.

This device is very common indeed on the coins of Taras, or Tarentum, in Italy, (Hunter 305.)

Fig. 7.—A small copper coin, purchased from an Armenian in Calcutta, bearing on one side a handsome head of the city, with a turret-crown. On the reverse—a Griffin, with something in her mouth. Above—the inscription is of three lines, of which the letters LCΛ...

AN TIOXO
HTE

are visible. It may probably be of Antioch, in Syria.

Macedonian Coins.

Fig. 4.—A silver *drachma* of Alexander the Great. (As. Soc.) wt. 62 grains.

Obverse. Head of Hercules, beardless, covered with a lion's skin, coming under the ear like a horn.

Reverse. Jupiter seated, holding an eagle in the right hand: a staff in the left, along the left side AAΕΞΑΝΔΡΟΥ, and below ΑΣΙΑΕΩ. (βασίλεως).

Fig. 5.—Another, similar, but of half of the size, *hemidrachma*.

Another, *tetradrachma*, (220 grs.) of similar device. As. Soc.

Fig. 10.—Another, legend illegible. Ditto.

The head of Alexander himself occurs very rarely on the coins of his reign:—they are known by the ram's horn on his forehead introduced as a mark of his descent from Jupiter Ammon: the ram's horn is quite different from the lappet of the lion's skin in the present specimens, which might at first mislead the student.

Fig. 8. Obverse.—Head of Hercules in the lion's skin.

Reverse. A club, with the inscription ΑΕΥΚΑΔΙΩΝΤΙΜΟΘΕΟΣ.

Fig. 9.—Another coin, of the same device, with ΑΕΥΚΑΔΙΩΝ ΑΑΜΥΛΟΞ. Both in possession of Col. T. Wilson.

These two coins were struck at Leucas, a town near the celebrated promontory of the same name in Acarnania, whence Sappho precipitated herself into the sea. The Hunterian Cabinet contains a multitude of coins of this place, but none with these names of Timotheos and Lamulos, or Damulos.

Syrian Coins. (Fig. 11.)

Next to the Alexandrine series, in point of time, and of merit, rank the coins of the princes of Syria, the descendants of Seleucus Nicator, who, upon the partition of Asia among the officers of Alexander, took possession of Syria, and subjected to his sway all the provinces up to the Indus. Of the Seleucidæ kings, I lately obtained one silver coin from a Babylonian Jew; it is represented in Fig. 11, and is in beautiful preservation; the head, in high relief, and of exquisite workmanship, wears the fillet or diadem, which belonged exclusively to royalty, and was not even assumed by the Roman emperors, until the reign of Diocletian. On the *reverse*, is a sitting figure of Ceres, with a cornucopia in her left hand, and a sceptre (or torch?) in her right. She sits on an ornamental chair, the leg of which is formed of a winged Cupid with a Dolphin tail. Beneath is a symbol compounded of the letters A and T which is supposed to stand for Antioch. The inscription is distinct ΒΑΣΙΛΑΕΩΣ ΔΗΜΗΤΡΙΟΥ ΦΙΛΑΔΕΛΦΟΥ ΝΙΚΑΤΟΡΟΣ, which refers to Demetrius II. Nicator, who reigned 145 years before Christ. It is a *tetradrachma*.

Fig. 6.—A small silver *drachma* in the Society's cabinet. Head, in good relief, with simple band.

B. C. 292. Jupiter seated on a solid altar, holding thunderbolt, or priest sitting on the veiled stool. Down the sides
ΒΑΣΙΛΕΩΣ ΔΗΜΗΤΡΙΟΥ.

This coin of Demetrius is recognized to be Seleucidan, from the figure of Apollo sitting upon a peculiar altar described by Pinkerton as "a hamper inverted. Some think this seat is that upon which the priest of Apollo at Daphne, near Antioch, used to sit to return oracles. It was placed over an aperture of the floor of the temple through which the gale of inspiration was thought to raise." A Demetrius occurs in the Macedonian series—and also among the Bactrian princes.

Egyptian Series.

The coins of the Ptolemæan dynasty equal, in beauty and interest, the others of Macedonian origin: the silver pieces are very numerous, the brass and copper pieces exceed in dimensions all other antiques: they weigh about two ounces. The Eagle almost always appears as the reverse of the Egyptian kings; the date of the reign is also marked on the silver in Greek numerals preceded by L or *λυκα βαυτος*.

GREEK COINS.



All of the silver specimens in our possession seem to belong to the same Ptolemy, from the marked physiognomy and projecting chin.

Fig. 12.—A silver *tetradrachma*, brought from Egypt by Mr. Drew.

Obverse. Head, with curly hair, bound with a diadem.

Reverse. The Eagle of Jupiter standing on a thunderbolt, with the inscription ΠΤΟΛΕΜΑΙΟΥ ΒΑΣΙΛΕΩΣ ΠΑΛΙΗ (anno 18).

A coin of Ptolemy the First of Egypt, or it may be of Ptolemy the Fifth, B. C. 204, as Pinkerton says his coins have mostly the letters ΠΑ or ΣΑ, explained to signify Paphos or Salamis, both cities of Cyprus, which island was part of the Egyptian monarchy. The weight of all these coins is about 212 grs. ;

<i>Another.</i>	Same device	L H	or	Anno 8	belong-	J. P.
<i>Another.</i>	Ditto	L I Γ		Anno 13	ing to	J. P.
<i>Another.</i>	Ditto	L I Δ		Anno 14		J. P.
<i>Another.</i>	Ditto	L I Δ		Anno 14		As. Soc.
<i>Another.</i>	Ditto	L I E		Anno 15		„
<i>Another.</i>	Ditto	L I Z		Anno 17		„
<i>Another.</i>	Ditto	L I L		Anno 17		„
<i>Another.</i>	Ditto	L I H		Anno 18		„

A large copper coin of one of the elder Ptolemies, bearing ΠΤΟΛΕΜΑΙΟΥ ΒΑΣΙΛΕΩΣ. Same head and eagle. The copper coins seldom had any date. Weight 740 grs. J. P.

After the subjection of Egypt as a Roman province, the Emperor's head always appears on the obverse; the eagle remaining still the most common device on the reverse. *Fig. 14* is a drawing of the reverse of two coins of Nero in my possession: the legend is ΑΥΤΟΚΡΑ (for αυτοκρατορος *imperatoris*) with the date ΛΙΑ (anno 11.)

Fig. 16.—Is the reverse of a Greek coin under the Roman Emperor Trajanus Decius, (A. D. 250.) It represents the metropolis of the Samosasan colony, as Cybele, with her turretted crown sitting on a cliff overhanging the ocean; in her hands are an eagle and a spike of corn, at her feet a horse, and around her the legend ΦΛΑΜΟΚΑΤΕΩΝ ΜΗΤ ΚΟΜ *Flavium Samosatensium metropolis Commagenes*. On the obverse around the head of the emperor is the inscription ΑΥΤΟΚΡ. ΤΡΑΙΑΝΟΣ ΣΕΒ.

According to Pliny *Samosasa* was a town of Commagenes on the Euphrates. It was called *Flavia* when taken by Cæsennius Pætus and Vespasian. The coin is noticed in Baudurius' work on the medals of the Emperors. The Society procured it from an Armenian, with other Roman coins, and I have here introduced it as a better example of the Grecian colonial coinage than that of Prusa in my former plate.

Parthian or Arsakian Coins.

The Parthian monarchy was erected by Arsaces, who filled the office of satrap in Bactria, in the year 256 B. C.. He had opposed the designs of Theodotus, who had first revolted from the third Syro-Macedonian monarch, and had raised the Bactrian provinces into an independent kingdom. Being unsuccessful, he fled to Parthia, where he expelled the governor, and declared himself independent. Vaillant, the numismatologist, has written a copious history of this powerful dynasty; and has endeavoured to classify the coins of the 29 Arsacidæ kings: but it is generally acknowledged that there is too much of the fanciful in his appropriations, and most antiquarians have given up the attempt. The greater number of the Parthian coins have the same name, ΑΡΣΑΚΟΥ, with different epithets,—king of kings, the great, beneficent, lover of the Greeks, &c.: the heads however, are very distinct and numerous.

The most rational mode of arrangement is, to place those which are best executed first, (for Greek workmen were doubtless then employed.) And, as the execution falls off, and the Greek characters become obscure, we may suppose the dynasty to progress towards its absorption into the Persian empire, in the reign of Alexander Severus. A. D. 226. There is a remarkable distinction in the head-dress of these princes; beginning with the simple band or diadem of the Greek monarchy, it gradually changes into a deep turban, and at length becomes a high-mitred cap, like that of the Persian monarchs.

We have two specimens of the larger silver Arsakian coins, and several of the smaller ones: the latter, upon which the characters begin to deteriorate rapidly, I have placed in Plate II. with the Persian coins.

Fig. 13.—One of two silver tetradrachms in the Society's collection.

Obverse. Head of Arsaces I. (dubious) facing the right; with broad diadem and straight hair.

Reverse. Victory offering a crown to the king, seated, with the legend ΒΑΣΙΛΕΥΣ ΒΑΣΙΛΕΩΝ ΕΥΕΡΓΕΤΟΥ ΔΙΚΑΙΟΥ ΕΠΙΦΑΝΟΥ ΦΙΛΕΛΛΗΝΟΥ; the third word ΑΡΣΑΚΟΥ is probably excluded by the die being too large for the coin.

Before passing to the rest of the Arsakian coins, I would here introduce

Fig. 15.—One of three copper coins belonging to the As. Soc.

They bear on the obverse, a well-executed head, bearded, and wearing a high-mitred cap. The characters and device on the reverse of two of them are nearly obliterated, but sufficient remains to shew the portrait of a female, (probably the wife of the king.) On the third,

which forms the subject of the engraving, some of the letters are distinct, and appear to read ΣΟΦΙΑ or ΟΦΙΑ (quasi *θεοφιλος*), and on the left hand are some illegible characters, (Phœnician?) differing in each.

Below the portrait are the three Greek numerals VNA or YNA (anno 454,) but of what æra, I am at a loss to conjecture ; it may be of the Arsakian or Armenian, but I must leave the point to those better versed in the subject.

To continue the *Arsakian* coins :—

Fig. 1. Obverse.—Head with wart on the forehead : hair dressed in rows of curls : plain band, with fillets hanging behind : an eagle apparently with a wreath in its mouth.

Reverse. Figure seated, holding out a bow over the characters [→ around ΒΑΣΙΛΕΟΣ ΒΑΣΙΛΕΩΝ ΑΡΧΑΚΟΥ ΕΤΕΡΓΕΤ ΔΙΚΑΙ ΕΠΙΦΑΝΟ ΦΙΛΕΛΛΗ.

Colonel Wilson had four coins with the same symbol, which Vaillant attributes to Arsaces Vonones XVIII. The eagle may also denote Chosroes (Vail. ii. 195.)

Fig. 5.—Obverse. Head of peculiar features, with pointed beard and hooked nose.

Reverse. Sitting figure in trowsers, with bow, very rudely executed and the legend ΒΑΣΙΛΕΟΣ ΑΡΧΑΚΟΥ ΕΠΙΦΑΝΟΥΣ ΦΙΛΕΛΛΗ

Colonel Wilson has one similar, and both correspond with one in Vaillant, marked Arsaces Mithridates II. (V. i. 69.)

Fig. 6. Head with plain turban and bow behind : same inscription on the reverse, very rudely cut.

Fig. 2. Head with mitred cap, and arched nose, well executed : type, same as fig. 1, ΒΑΣΙΛΕΩΣ ΜΕΓΑΛΟΥ ΑΡΣΑΚΟΥ ΘΕΟΠ ΑΤΡΟΣ ΝΙΚΑΤΟΡΟΣ, of better execution than either of the foregoing.

Vaillant ascribes the mitred cap to Arsaces Orodes. Col. Wilson had another coin of similar character.

Another. Mitred head similar to fig. 2, but without the hook ornaments : same type, ΒΑΣΙΛΕΩΣ ΒΑΣΙΛΕΩΝ ΑΡΣΑΚΟΥ ΔΙΚΑΙΟΥ ΕΤΕΡΓΕΤΟΥ ΦΙΛΕΛΛΗΝΟΥ.

Fig. 8.—Head with mitred cap, as in fig. 2, with a peculiar symbol behind it : same reverse.

Colonel Wilson has another similar to this in head-dress, it is ascribed to Arsaces Orodes (Vail. i. 145.)

Fig. 7.—Head with deep turban and mitred cap about it, and bow behind, with fillets of rudest fabrication : character quite perverted.

Another. Plain head-dress and device very rude, ΒΑΛΛΑΓΓΕΞ ΟΑΙΙΑΓΑΝ
ΑΙΗΥΝΟ ΓΥΙΗΓΝ ΔΙΧΑΙΟΥ .. ΧΑΝΟΥC.

In this the knowledge of the Greek letters seems very fast declining, and it is almost impossible to recognize the inscription to be identical with that of fig. 11.

Another. The same, but more legible; under the bow of all these there is a kind of altar formed like the letter \bar{A}

The average weight of the above Arsacidæ drachmæ is 60 grs.

Besides the devices given above, Col. Wilson had one head similar to fig. 1, with the symbols of the sun and the moon, and a star (fig. 4,) referred by Vaillant to Arsâces Artabanus (I. 221), and another with two small *victories*, holding wreaths over the head (fig. 3), which is not found in Vaillant.

Sassanian Coins.

The Sassanian monarchy in Persia commenced with the year 223, A. D. when Artaxerxes overturned the Parthian dynasty. It continued until itself overturned by the Mahomedan caliphs in the year A. D. 636. No mode of adjusting the numismatology of this period can be attempted until we are able to read the ancient *Pehlevi* characters in which their legends are expressed. Perhaps if a considerable collection of these coins was made (and they seem to be very common in Persia), some key might be discovered to the value of the alphabet, for the titles will be alike in all, and the names are known from history. It seems a great reflection upon the art, that the coinage of the celebrated Nushirvan should not be known even to his countrymen.

Fig. 9.—A silver coin in the cabinet of the As. Soc.

Obverse. The head of the king facing the left, with curly beard, and a large tuft of curly hair: a peculiar crown or cap with two feathers behind: around it a legend in Pehlevi characters, very distinct, but the purport unknown: it is given more clearly in A.

Reverse. A fire altar (*mithras*), with two priests or defenders, bearing swords or sceptres.

Another coin, similar, and inscription partly identical. (B)

Fig. 10.—Another similar coin. In lieu of the sacred fire on the altar is substituted the head of a king: little of the legend is visible.

In Colonel Wilson's collection are one or two more of a similar character, but the fire is the most common symbol: the legend on one of his (C) differs from the two above given in part, but one word is evi-

dently the same, so that probably that word and the one which precedes it in A and B are all common titles of the ruling monarch, as “King of Kings,” &c. (the Pehlevi reads like the Persian from the right to the left hand.)

Fig. 12.—A crescent head-dress of this form occurs in one of Col. Wilson’s coins, in other respects similar to the rest; also upon another coin the emblems represented in *fig. 31*, as variations of the priest’s wand or sceptre.

Fig. 14.—(of Col. Wilson’s series,) has characters which might be mistaken for Arabic, also emblems of the moon, stars, and the sacred fire.

Fig. 15.—A small gold coin, of very rude fabrication, brought by Lieutenant Conolly, from Khorassan: the head has a crescented cap, and the commencement of the second part of the inscription agrees with that of *figs. A and B*.

Reverse. The fire-altar, and priests rudely executed.

This coin was noticed in the *GLEANINGS*, vol. iii. 295.

Bactrian Coins.

In the reign of Antiochus II. the third of the Seleucidæ, Theodotus, the governor of Bactria, revolted and established an independent monarchy. His capital was the modern Balkh, and his extensive kingdom included parts of modern Kábul, Khorasan, and Bokhára. It is remarked by Major Tod as singular, that, although the Arsacidan money is so plentiful, antiquarians have seldom met with those of the Bactrian princes, and indeed the names of only nine of them have been rescued from obscurity. So little was before known, that Major Tod himself may be said to have commenced the development of this new branch of numismatology, and in a worthy manner,—by adding two new medals discovered in India to the only two hitherto known;—one of Apollodotus, found in the site of an old town, *Súrapura*, between Agra and Etaweh; the other of Menander from *Math’ra**. This example has instigated others to the search, and a number of Bactrian or Indo-Scythian coins are now coming to light in the upper provinces. I have before alluded to General Ventura’s discoveries; and to those of Messrs. Burnes and Gerard, in their route through ancient Bactriana; Col. Swiney of Kurnál has also been successful in collecting and examining, and we may therefore soon hope to have the subject thoroughly elucidated. Such coins as were in the Society’s cabinet, I have already depicted in the seventeenth volume of the *Researches*, to illustrate the learned remarks of Mr. Wilson, which should be perused by those who are now eager to pro-

* Trans. Roy. As. Soc. i. 314.

secute the inquiry. I have introduced into the present plate a few of the same figures, with a view to shew the general appearance of these curious coins.

Fig. 17.—Is taken from a cast made from the sealing wax impression of a gold coin found at Manikyala by Gen. Ventura.

Obverse. A standing figure with right-arm outstretched, and a kind of glory round the head: letters not decypherable.

Reverse. Figure of a warrior holding a spear in the right-hand, and apparently (from comparison with more perfect specimens of a similar coin) presenting an offering on an altar: the name illegible.

Fig. 18.—Is a drawing made in a similar manner from another of the Manikyala gold coins.

Obverse. The Persian head-dress and flowing hair are here apparent, but on the *reverse* the seated prince has rather the Indian costume. The characters on both sides are quite distinct, and have some similarity to Greek, but they have not been yet interpreted. There is a curious symbol upon all this class of coins, resembling a grid-iron or key, with sometimes three sometimes four prongs.

Messrs. Reinaud and Saint Martin of Paris (*Journal Asiatique* 1831) read part of the inscription on the *obverse* NANOBAΘOY PKIKOT, and on the *reverse* MANAOBA ΓO but nothing is gained therefrom. They ascribe the coin to Greek or Asiatic Princes who inherited the authority of Alexander's successors in the countries watered by the Indus.

Fig. 19.—A small copper coin, sent to me in a letter by Dr. Gerard, from the neighbourhood of Manikyala.

Obverse. The head of a king, with a kind of glory.

Reverse. An Equestrian figure, with the flowing ribbons of the Persian diadem: the characters are here decidedly Greek, and appear to form the usual title of βασιλεως βασιλεων.

Fig. 20.—Is a copper coin resembling the last, procured by myself at Benares.

The greater portion of the coins found at *Manikyala* are stated by Lieut. Burnes, to whom a copy of the plates of Mr. Wilson's Essay was sent by dāk, to have figures of a *Raja* dressed in a tunic sacrificing on an altar, on the *obverse*; and a figure standing by a bull on the *reverse* (As. Res. xvii. pl. ii. figs. 26 to 30): others are found with the impress of an elephant, and a kind of dagger (a female figure?) But as the inscriptions on these are rather Indian than Greek I have not included them in the present collection, and beg to refer the reader to the Asiatic Researches and to Col. Tod's Essay.

Muhammedan Coinage of Persia.

To complete the sketch of Persian coins, it seems necessary to offer a few brief remarks on the coinage of the Muhammedan powers which succeeded the Sassanian dynasty,

At the period of the promulgation of the religion of Muhammed, the money of the lower Roman empire was current in all the neighbouring countries, and it was not until the *Khalifat* of *Abd-ul-malek*, in the year of the *Hejra* 76 (A. D. 695), according to Marsden, that a distinct coinage was instituted with a view of superseding the currency of Greek, or Byzantine, and Persian, gold and silver.

The circumstances that led to this event are thus detailed by the Arabian writers.—“The Khalif having adhered to the practice of commencing his epistles, addressed to the Greek Emperor, with the Musulman formulary sentence, declaring the unity of the Godhead, and the ministry of the prophet; the Christian monarch took offence at what appeared to him an insult, and threatened that if it were persisted in, he should retaliate by introducing into the inscriptions on his coinage, with a view to its being circulated throughout the dominions of the former, words not likely to be acceptable to the professors of Islamism*.” This impolitic contention produced the effect that might have been expected, and *Abd-ul-malek* determined to be beforehand with him in blazoning the creed of the faithful upon a new coin of his own fabrication, and he procured the ablest artisans from Damascus to cut the dies. Many of the first Muhammedans were however scandalized at allowing the sacred name of God to be profaned by the contact of impure hands.

The names of the Arabic pieces of money are uniformly inserted in their marginal legend, and are all taken from the coins of the lower Roman empire. Thus the copper piece was called *فلس* *felus* from *follis*; the silver *درهم* *dirhem*, from *drachma*, and the gold coin *دينار* *dinar*, from *denarius*, which though properly a silver coin, was used generally to denote coins of other metals, as the *denarius æris* and the *denarius auri*, or *aureus*.

The Society's cabinet does not possess any of the early Muhammedan coins; but one brought by Lieut. Conolly from Persia (fig. 16, Pl. II.) will serve as a general specimen of all those of the Ommiah and Abbas Khalifs. They contain the date and place of fabrication, but not the name of the prince. The coins of the Samanian dynasty in Persia differ but little in appearance; but they bear the name of the sovereign under that of the prophet. The Sultans of the Seljuk dynasty, who

* Marsden's Numismata Orientalia xvi.

arrested the whole of Asia Minor from the Empire in the 11th century, struck the emblem of the sun in the constellation of the lion upon the obverse of their coin, and these devices have since become well known as the chivalric order of distinction in Persia: its origin is referred by Marshman to the horoscope of *Gheat-ud-dín Kai Khusrú*, who began to reign in 1236. The earliest mention of it is in Tavernier's Travels, 1676. The kings of the Turkman or Ortokite dynasty, in the 13th century, introduced heads on their coin in imitation of the Syro-Macedonian kings, notwithstanding the supposed prejudice of the faithful against such devices. The Persian term *sháh*, rex, occurs for the first time on the coin of *Kutb-ud-dín Ghází*, A. H. 580. The coins of this period are so irregular, that Christian marks and names are sometimes visible on them: signs of the zodiac were also frequently introduced. The Fatimite dynasty restored the primitive form and purity of the Kufic inscriptions. Their coins have generally more than one concentric circle of inscription. They also exhibit the several localities of Arabia, Syria, Egypt, and Sicily.

The coins of the *Il-Khanian* or Moghul dynasty of Persia are known by the title of *Kaan*, *Khan*, and *Sultán Ahzem*, in connection with the name of the sovereign. The writing is generally contained in an ornamental or scalloped frame, such as is now common in the coins of Persia, Nipal, and other oriental countries.

These very general remarks will be sufficient to afford a clue to the classification of the coins of Persia, when the legend may not be sufficiently legible to determine them: the subject has been most ably expounded by Mr. Marsden, in the work already quoted from; and to it all must refer who would pursue this branch of numismatic study.

Fig. 16.—A silver coin of the Khalifs of the second century of the Hejra, bearing on the area of the obverse the usual formula in the Kufic character:

لا اله الا *Non est Deus præter*

الله وحده *Deum unicum*

لا شريك له *cui non est socius.*

In a circle around which is inscribed

بسم الله ضرب هذا الدرهم بواسط سنة تسع وعشرين ومائة

In nomine Dei cusa est hæc drachma in Wasit. Anno 129, nono et vicesimo et centesimo. (A. D. 746.)

On the reverse it has the usual inscription.

الله احد الله *Deus unus, Deus*

الصد لم يلد ولم	<i>æternus, non gignit, et</i>
يولد ولم يكن	<i>non generatur et non</i>
له كفوا احد	<i>ei compar unus.</i>

On the margin it has a quotation from the Koran (Sura ix. 33.)

محمد رسول الله ارسله بالهدى ودين الحق لتظهره على الدين كله ولو كره المشركون

Muhammed est legatus Dei, qui misit eum cum doctrina et religione vera, quo eam extolleret super religiones omnes si vel refragarentur associantes.

In Hallenberg's *Numismata Orientalia* are described several coins of the same age, the nearest in point of date is one of 126 Hij. (A. D. 743.) Merwan, the son of Muhammed, &c. and 14th in descent from Ommiah, came to the Khalifat in A. H. 127; and was killed in 132, being the last Khalif of that race.

Wasit, the town at which the coin was struck, was so called, says the same authority, from being half-way (middle) between Basra and Kufa, it was built by Ibn-Gjuzi in 75 Hij. and remained the seat of the Khalifs and of the coinage until the Abbasidæ succeeded to the Ommian Khalifs, when the capital was established at Mohamadiah (or Bagdad) as proved by coins struck in the year 137 Hijra.

In the third volume of the *GLEANINGS*, Plate XXIII. are depicted four Persian gold coins, also brought from Persia by Lieut. Conolly, which appear to belong to the Seljuk dynasty. In fig. 3, the words *ul-malek* are legible, but it requires some experience in the Kufic character to decypher the remainder.

IV.—Eclipses of Jupiter's Satellites.

Observations by Walter Ewer, Esq. at Chaprah.

	Mean time.			Difference from Nautical Almanac.		
	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
4th December. Em. I. Sat. at 8 46 34	5	38	50			
3½ ft. achrom. Troughton. power 80—capital observation.						
5th Em. II. Sat. at 7 18 51	5	39	27			
same telescope, not so good, noon being too bright.						
20th Em. I. Sat. at 7 7 43	5	38	59			
5 ft. achrom. Troughton, clear and good.						
27th Em. I. Sat. at 9 4 7.5	5	39	14.5			
same telescope, rather hazy.						

V.—*A method of preparing Strychnia.* By J. T. Pearson, Esq. Assistant Surgeon.

The enormous price of 120 rupees having been paid at the Hon'ble Company's Dispensary for a single half ounce of strychnia; it became my duty to attempt to prepare it, by a process, more expeditious and less expensive, than that recommended in the formulary of Magendie*; and which, at the same time, should be equal to the demands made upon the department. I hope that both these objects have been effected by the following method:

Infuse a determined quantity of Nux Vomica in boiling distilled water, until it becomes soft; take it from the liquid, bruise it coarsely in a large metal mortar, and treat it with successive infusions of boiling distilled water, till it becomes nearly tasteless. Strain the liquids, and having mingled them together, boil with calcined magnesia for half an hour, and collect the precipitate upon a filter of fine muslin. When the precipitate has become free from the liquid, wash it gently, twice, as it lies on the filter, with cold distilled water, and afterwards dry it upon a water bath.

Treat the precipitate, dried as above-mentioned, with successive portions of boiling alcohol, sp. g. .838, or stronger, until it becomes quite exhausted, then mix the whole of the filtered alcoholic liquid, and evaporate in a water bath, till a thick crust forms upon the surface; set it aside to crystallize for twelve hours; pour off the mother waters, and collect and dry the strychnia upon filtering paper.

In this state, the strychnia is in small, but by no means microscopic, irregular crystals, of a light-brown colour; and it may be purified by redissolving and re-crystallizing it in boiling alcohol, or by pouring over it portions of rectified æther.

* The following is the process given by Magendie. "Add a solution of liquid subacetate of lead to a solution of alcoholic extract of the Nux Vomica in water, until no more precipitate be thrown down; the foreign matters being thus separated, the strychnine remains in solution, with a portion of colouring matter, and sometimes an excess of acetate of lead. Separate the lead by sulphuretted hydrogen, filtrate it, and boil with magnesia, which will unite with the acetic acid, and precipitate the strychnine. Wash the precipitate in cold water, redissolve it in alcohol, to separate the excess of magnesia, and by evaporating the alcohol, the strychnine is obtained in a state of purity. If it be still not perfectly white, it must be redissolved in acetic or hydrochloric acid, and reprecipitated by means of magnesia." To prepare the alcoholic extract, the Nux Vomica must be rasped and exhausted by repeated macerations in alcohol, which must then be evaporated; a process the tediousness of which can only be duly appreciated by those who have tried it, and which it was my object to avoid.

By the foregoing process, sixty-five grains of strychnia were obtained from four pounds of Nux Vomica, at a cost of three rupees : a saving at the rate of more than two hundred rupees upon a single ounce. It was much purer than that purchased, as mentioned in the beginning of this paper ; and a dose of half a grain, given to rabbits, killed one in a minute and half ; and another in five minutes ; whilst a small dog, after having taken a grain and half fell in fourteen minutes and half, and died at the end of twenty-five. The delay in the death of the second rabbit, which did not take place until a second dose was in the act of being administered, may perhaps be attributed to the strychnia having been given in crystals instead of in powder ; a state in which the difficulty of its solubility in watery secretions would of course be greatly increased. *After this, I need scarcely add, that STRYCHNIA, like ARSENIC, MORPHIA, CORROSIVE SUBLIMATE, and other strong poisons, should never be given but in SOLUTION ; it being impossible in any other manner accurately to measure the dose.*

Note.—I wish it to be understood, that for the foregoing process I do not lay any claims to originality. I may however mention that beyond a knowledge that Robiquet's process for morphia had been pursued with strychnia, the details of which I have not met with, it is new to me. Should you think the subject worthy of attention, I propose to give you, in a future paper, my views of the rationale of the process, together with the results of more extended trials now going on under my superintendence at the Hon'ble Company's Dispensary.

VI.—*Proceedings of the Asiatic Society.*

Wednesday Evening, 9th January, 1833.

The Hon'ble Sir Edward Ryan, President, in the chair.

After reading the Proceedings of the last regular meeting and of the special meeting of the 19th December, the Society proceeded to ballot for the officers of the ensuing year, when Sir C. T. Metcalfe, Bart., Sir John Franks, and the Rev. Principal Mill were elected Vice-Presidents.

Mr. James Prinsep was unanimously elected Secretary.

The Rev. Dr. Carey, Mr. J. Calder, Mr. J. Tytler, Rev. Mr. Proctor, Baboo Ram Comul Sen, Mr. J. R. Colvin, Mr. D. Hare, and Dr. J. Pearson, were elected Members of the Committee of Papers.

Mr. Clemishaw and Baboo Radhacant Deb, proposed at the last meeting, were elected Members.

The Hon'ble Sir R. W. Horton, Governor of Ceylon, proposed at the last meeting by Mr. Wilson, seconded by Mr. J. Prinsep, was upon the favourable report of the Committee of Papers, unanimously elected an Honorary Member.

Sir Benjamin Malkin, Recorder of Penang, was proposed by the President, seconded by Mr. Prinsep, as an Honorary Member, and referred to the Committee of Papers.

Upon the Report of the Native Secretary, that since the retirement of Mr. Colebrooke, in the year 1830, from the office of Agent to the Society in England, no new appointment had taken place; it was resolved, that a letter be written to Mr. Wilson, requesting him to act as Agent, and to take charge of any property or money belonging to the Society in England.

Upon the suggestion of the Secretary, it was resolved, that an extract from the Proceedings of this Society, containing the Address presented to Mr. H. H. Wilson, by the Society, on the occasion of his departure from India, and his reply, be printed to accompany the Seventeenth Volume of Researches, just published under his superintendence.

Read a letter from H. M. Parker, Esq. Officiating Secretary to Government, announcing, that Government had complied with the application for freight to England of 100 copies of the Seventeenth Volume of the Researches.

The accounts of the past year were submitted, exhibiting the following Balance in the Society's favor on the 31st December, 1832.

RECEIPTS.				PAYMENTS.			
By Balance on the 1st May,	11,242	4	9	To Cash drawn from Mackintosh & Co. since 1st May,	5,625	11	11
By Collections to the 31st Dec. since paid in to Mackintosh & Co.	6,131	1	10	To Purchase of Govt. Loan, Rs. 25,000, lodged with the Govt. Agents,	25,386	14	2
By Legacy of £2000, left by Will of the late C. K. Bruce, with interest, recd. from Cruttenden & Co.	25,037	0	0	Balance with Mackintosh and Co.	11,397	12	6
	42,410	6	7		42,410	6	7

The Balance 11,397 12 6 is unfortunately involved in the failure of Messrs. Mackintosh and Co.

The sums due by the Society are as follows:

To the Military Orphan Press, for Seventeenth Volume of Researches,	4,286	14	0
Mr. J. Prinsep's Bill, for Plates of the Physical Transactions, House Repairs, &c., passed by the Committee of Papers,	1,023	15	1
Establishment for December, and sundries,	249	0	0
Total, Rs.	5,559	13	1

Resolved, that the accounts be referred to the Committee of Papers, to determine upon the best mode of liquidating the present demands.

Museum.

1. Read a letter from the Private Secretary to the Right Hon'ble Sir R. W. Horton, forwarding two antique coins for examination.
2. Three small Buddha images, presented by Baboo Ram Comul Sen, in the name of Mr. Wilson.
3. Specimens of Coal from the Kasya Hills, presented by Mr. Cracroft.

Some hundred maunds of this Coal have lately been sent on trial to the Calcutta Mint, where it has been found of a quality far superior to any from the Burdwan

Collieries, for Engine and Reverberatory furnaces, in the ratio of 5 to 4, The composition of the Coal tried at the Assay Office, was,

Volatile matter or gas,	38.5
Carbon or coke,	60.7
Earthy impurities or ash, . .	0.8
	<hr/>
	100.0

The ash is wonderfully small : specific gravity of the Coal 1.275.

4. Specimens of the Sandstone of Sikrigali, with vegetable impressions of ferns, &c. by Dr. Langstaff.

“The sandstone appears to correspond with that from Chira Punjí with vegetable remains. This rock forms the bluff termination of the ridge immediately adjoining the river: below it, and I believe interstratified with it, is the perfectly horizontal stratum of silicious schist with impressions of ferns and mosses, and apparently the remains of shells.

“In the same situation are blocks of the hornblende rock, and basalt, abounding from Monghyr to Rajmahal. Although the trap formation is contiguous to the sandstone, the latter does not seem to have undergone any disturbance of its horizontal position, which would argue its formation to be more recent than the trap.”

5. A letter from Dr. Spilsbury, announcing the dispatch of a specimen of fossil bone from Jabalpúr.

Library.

A copy of his work on the “Muhammedan Law of Inheritance,” presented by N. B. E. Baillie, Esq.

Ditto, of the 2nd edition of Wilson’s Sanscrit and English Dictionary, by the author.

Read a letter from M. Burnouf, the Secretary, forwarding the following works from the Asiatic Society of Paris :

Burnouf’s *Vendidad Sadi*, parts 5th to 9th.

Cassin,—*Almanach Philanthropique*, 1 vol.

Levasseur and Rutz,—*Tableau d’Elemens Vocaux de l’Ecriture Chinoise*.

Brosset Jeune,—*Chronique Georgienne*, 1 vol.

Deslongchamp’s *Manava Dharma Sastra*, 3rd part.

A. L. Chezy’s *Sacountala*, 1 vol.

The following Books from the Book-sellers.

Niebuhr’s *History of Rome*, 2nd vol.

Lardner’s *Cabinet Cyclopaedia* ;—the United States, 2nd vol.

Literary.

A Paper on the Origin and Classification of the Military Tribes of Nipal, by B. H. Hodgson, Esq.

A Note by the same gentleman, on the Law and Legal Practice of Nipal, in matters of adultery or connection between a Hindoo and an outcast.

Note on the Ceylon Coins, by the Secretary.

The two coins transmitted by His Excellency, the Governor of Ceylon, belong to the class described by Mr. Wilson, in the seventeenth volume of the *Researches*, and depicted in Plate V. figure 109 to 113, which are stated, like the present coins, to have been found by Colonel

Mackenzie at Dipaldinna. No. 3, according almost exactly with the present copper coin, "is a drawing of one found at Kandya in Ceylon."

Mr. Wilson does not attempt to explain them further, than they evidently belong to a Hindoo dynasty, either on the island of Ceylon, or in the south of the peninsula. The letters are distinctly Hindí in all, although it is difficult to make out their purport. The word "*Sri*" is also evident in all of them.

Description.

No. 1. A gold coin, weighing 60 grains.

Obverse. A male figure, seated in the Indian manner, with *dhótí*.

Left hand raised, and face looking to the left: on the side, the Nagari characters श्री लंके वर, *Sri Lankeswar?*

Reverse. A rude standing figure, with a flowing robe, right hand extended over two emblems ✡ ±

Left hand supporting a crown or globe? Beneath a scroll, with circles or flowers on the right.

No. 2. A copper coin, very similar, but more rude. The inscription on the *obverse* is, श्री गन्या दयमथ, *Sri g nya d y m th?* On the *reverse*, the standing figure as before.

In Davy's Ceylon, page 245, will be found a drawing of an antique gold coin, called a Dambadinia Rhatra (*rhatra*, gold), which was found in the neighbourhood of Dambadinia, in the Seven Korles, a place of royal residence (no doubt identical with Dipaldinna of Col. Mackenzie.) The drawing of this coin is precisely similar to those of Plate V. and to the one now before the Society, and so is the copper coin alluded to by Davy as the Dambadinia chally (*chally*, means copper.)

Davy does not seem to have comprehended either the device or the characters on his coin, for he has reversed the engraving of the side bearing the inscription, and he supposes both to be mere hieroglyphics. To an eye accustomed to such objects, however, the standing and sitting figures are very evident, as are the Nagari characters, although their purport is not so clear: indeed, of the half dozen, to which we can now refer, no two seem to bear the same name, nor are we acquainted sufficiently with the ancient history of Ceylon, to be able to fill up the doubtful names on the coins from any well certified list of princes of the Hindú dynasties in Ceylon of the *Soorea-wansé* (or *Súrj-bansí*) race.

VII.—Miscellaneous.

1.—*Hot-spring at Pachete.* By C. Betts, Esq.

As a correspondent of the *Journal* is desirous of knowing the localities of any hot-springs met with in India, I beg to put on record this notice of one found by me in the river Damuda, near the Tántotya village, and about six miles distant from the Pachete hills. In the cold season, when the river is very low the thermometer plunged into it rose to 190° Farh. The spring is slightly chalybeate.

2.—*Extraordinary Banyan Tree at Kulow Nagty Hally, near Bhuoma Naik Droog. in the territory of Mysore.*

This tree assumes to the traveller's eye the appearance of a very beautiful grove, which in reality it is.

The centre tree is about fifty or sixty feet in height, and its branches cover an area of seventy-six yards in one direction, and eighty-eight in the other, while the drops now dependent from, or rather supporting, its gigantic branches, amount in number to one hundred and twenty-one, of which some are of enormous size. The place exhibits on all sides vast branches, broken off, which have been evidently once connected with thirty trees, now disunited from the centre stock; but the original connexion can still be sufficiently traced to render unnecessary the testimony of the villagers, who state that they and their fathers have been in the habit of disuniting these trees by separating the intermediate parts for the construction of solid cart wheels, for which, from their size, they are well suited. On measuring the transverse diameters of the whole area, they were found to contain more than 100 yards each way. This single tree thus affording a circle of foliage and shade exceeding 300 English yards in circumference.

3.—*Discovery of the Silhet Coal Mines.*

Mr. James Stark discovered, early in 1815, some coal mines on the lower hills of Silhet, and worked them sufficiently deep to send down samples to the Government through Mr. Dacosta. By directions from Mr. A. Trotter, then Secretary, Public Department, about 50 maunds were sent to the foundery in Fort William, the same quantity to the gun-carriage yard at Cossipore, and an equal quantity was tried in the Mint, as also 25 maunds at Mr. Jessop's. The reports on these samples proving favorable, Mr. Stark submitted proposals for supplying Government with coals, at 1 rupee 8 annas per maund, to any extent required, of the quality of the samples sent, and even superior; these being declined, he next obtained the indulgence of Government to import into Calcutta duty-free, for five years. The first thousand maunds having arrived in Calcutta, and remaining on hand unsold, he abandoned the mines.

5.—*Questions proposed by the Burmese Heir Apparent.*

“The Philosopher Burmese Prince is an extraordinary man. He is self-taught, and although of naturally good talents, he is very timid, and much alarmed that his turn for scientific subjects should be known to the King and Ministers. A gentleman who has also a turn that way, and has seen him frequently, declares him to be a wonderful man, and if in any other country but this, where he could without fear follow the bent of his mind, he would soon prove himself a person of superior acquirements. He is anxiously looking out for a Comet that is to appear this month, and which I believe by the calculations of some French Astronomer is to destroy the earth. He has a very good Telescope—a Thermometer—a Barometer—a Stomach Pump, and I believe an Air Pump—all of which he is obliged to keep shut up. Subjoined are some questions put by him to a gentleman here, which it is hoped some one may be able to solve for his satisfaction.

1st. He has observed, that the last three Comets have appeared in the same sign in the heavens, that the Moon's node was in at the time; is this accidental, or has the node any connection with Comets?

2nd. On what data does Sir Isaac Newton found his hypothesis of the heat of a Comet being 900 times greater than that of red-hot iron?

3rd. Is not the height of the atmosphere increased at new and full moon in the same manner that the waters of the ocean are raised, but to a much greater extent? If so why does not the Barometer indicate it by rising?”

VIII.—Progress of European Science.

PRACTICAL ASTRONOMY.

Under this head may be comprehended all proceedings intended to bring us better acquainted with the phenomena of the heavenly bodies through the medium of observation and experiment :—the labours of astronomers in their observatories ; the construction of new instruments ; of new tables to facilitate calculations ; of new maps of the heavens, &c. to which may be added pendulum experiments and the various geodetical operations on a grand scale, destined to the determination of the earth's figure. Of the latter branch of our subject, we have on a former occasion taken a cursory review, adverting to the survey now in progress in our own neighbourhood. In our last number also we anticipated the present notice by inserting an abstract of the contents of the new Nautical Almanac, which itself marks the progress of astronomical science, by the new wants that it is found necessary to supply to the practical astronomer to save the waste of his time in intricate calculations. We will now advert to the increased means set at work in the world for the pursuit of this noble and heart expanding study, taking as our guide the annual reports of the president of the Astronomical Society : for in the present day, thanks to the systematic division of the sciences among their proper societies, information on each separate branch can be obtained at once without spending much time in searching through scattered notices in journals of general science.

Mr. SOUTH, in his address on the anniversary of February, 1830, congratulated the Society on the prosperous appearance of the astronomical horizon. He attributed with justice to the influence of the institution over which he presided, a part of the unusual activity prevalent, as well abroad as at home, in prosecuting observations, and in perfecting the theories and tables of celestial phenomena.

He noticed the establishment of no less than two new observatories endowed by the British Government : one at the Cape of Good Hope, under the Rev. Mr. FALLOWS ; the other, the Paramatta Observatory, originally founded by Sir THOMAS BRISBANE in New South Wales, now converted into a permanent public institution. The East India Company had been equally active : they had remodelled their observatory at Madras, furnishing it with new instruments and appointing to the charge of them Mr. TAYLOR, an experienced astronomer from the Greenwich Observatory. An attempt had before been made to found an observatory at Bombay, which had failed through the bad management of the astronomer nominated there. At the anniversary of last February, the same illustrious president noticed the foundation of another observatory by the Company, in the Island of St. Helena, under the charge of Mr. JOHNSON : and *pari passu*, the British Government had presented a 3½ feet transit, by Troughton, and other valuable instruments, to the private observatory of M. DABADIE, on the Island of Mauritius, whither also a number of excellent instruments had been carried by Captain LLOYD, Surveyor General to the colony. Monsieur DABADIE'S observations on the Comet of 1830 have brought this well-merited reward, not to himself alone, but generally to the zealous exertions of this scientific little island, which can boast of more than its due proportion of naturalists and literary men. Astronomy is well adapted to be the study of an insulated quiet seat of contemplation like this isle, or St. Helena, and some questions of great practical importance, such as that of the refraction on the oceanic horizon, might here be more successfully investigated than any where else.

Captain KING, R. N. also is mentioned as proceeding to New South Wales, provided with superior instruments for his own use.

Here is a goodly list of the astronomical emissaries from our own island, and yet it is doubtless full of omissions: for the amateurs must be more numerous in this than in any other science. Nothing of course was yet known in England of the appointment of Captain HERBERT as astronomer to the KING of Oude. From the magnificence conspicuous in all oriental undertakings, we may safely prognosticate, that the Lucknow Observatory will become a richly endowed establishment, if the life of the founder be spared to complete it. We cannot pause to follow the list of illustrious observers enumerated in Great Britain itself, at Cambridge, Duhlin, Greenwich, Kew, London, and Edinburgh: nor of those on the continent, where the activity of the new observatories of Brussels, Cadiz, Cracow, and Geneva, are stated to be already rivalling the older establishments of Paris, Berlin, Moscow, Florence, and Vienna. Now let us see what has been produced at these rival observatories, for that is the best way to judge of their relative and positive merits.

The Greenwich Observatory has lately issued a *catalogue* of 720 stars: selected and reduced from the catalogue formerly published by the Astronomical Society. This fundamental catalogue has now reached a degree of accuracy unexampled in astronomical history, and bids fair to preserve the credit of "*the British Catalogue*" of the good old times of FLAMSTEAD.

The Paris Observatory seems to have been dormant for a long time. A new transit and a splendid equatorial by *Gambey* have once more set it in activity, and an excellent rule of the Institute has imposed upon the superintendent the necessity of never being more than a year behind hand in publishing the results of his labours.

Professor BESSEL has been employed upon pendulum investigations, and has come to the mortifying conclusion, that the corrections employed by British experimentalists are by no means correct! Mr. FRANCIS BAILY also has demonstrated the existence of certain imperfections in the apparatus which point out the necessity of fresh inquiries before the standards of weights and measures, upon which such care has already been spent, can be considered as finally settled!

Professor ENCKE has entitled himself as much to the gratitude of astronomers in general, as to the medal so justly awarded him by the Astronomical Society, for the *Berlin Ephemeris*, which bears his name. While the Nautical Almanac has been gradually retrograding, and the *Connoissance des tems* stationary, the Berlin Almanac has suddenly stepped in advance of both, and so full are its contents, and so excellent its arrangement, that, as Mr. SOUTH says, "with it an observatory scarcely wants a single hook; without it, every one." The new Nautical Almanac will be one of the fruits for which we are indebted to ENCKE's example, and we hope it may prove, according to the President's promise, "as superior to ENCKE's, as ENCKE's is now superior to it."

The Royal Academy at Berlin has carried into complete effect its plan for a minute survey of the heaven, and for the formation of a new set of celestial charts. Three portions of this useful and valuable undertaking are already published: viz, the 10th hour in AR by professor GÜBEL of Coburg, the 14th hour by the Rev. T. J. HUSSEY of Chislehurst, and the 18th hour by Padre GIOVANNI INGHIRAMI of Florence, and M. CAPOCCI of Naples. The catalogues contain a list of all the stars (reduced to the year 1800) within 15° of the equator down to the 10th magnitude: and when complete, will be a most valuable acquisition to the practical astronomer.

Of the labours of one member of our own Royal Observatory, we must take a fuller review: we allude to those of Mr. RICHARDSON on the *constant of aberration*.

In extracting for this purpose the words of Mr. SOUTH's address on presenting the author with the gold medal, we are in fact giving a most luminous and interesting review of the history of this subject, so closely connected with the demonstration of the Copernican system.

"Three hundred years have now elapsed since COPERNICUS proposed to the world that system which bears his name; and if we except the labours of TYCHO BRAHE, who, besides a catalogue of 800 stars, made attempts to determine the altitude of the pole-star at different seasons of the year, little was done by practical observation to support or refute the ideas of COPERNICUS till the time of GALILEO. Observations of the eclipses of *Jupiter's* satellites induced him to propose them as a means of determining differences of longitude, whilst his discovery of the phases of *Venus* removed a serious objection to the truth of the Copernican system, and which COPERNICUS himself predicted would be removed, though he had not the means of doing so himself. About the year 1665, HUYGENS, by his invention of the pendulum clock, gave to astronomical observations an accuracy hitherto unknown; and CASSINI, by means of the excellent glasses of CAMPANI, accumulated a vast mass of observations of the eclipses of *Jupiter's* satellites, and deduced from them tables whereby astronomers could predict their occurrence.

"Notwithstanding the powerful arguments advanced in its favour, the Copernican hypothesis was not generally embraced; for in the year 1669, nearly a century and a half subsequent to its promulgation by COPERNICUS, even the celebrated HOOK, to use his own words, 'would not absolutely declare for it*.' To settle the matter, therefore, this extraordinary man, feeling that the instruments of TYCHO, although magnificent beyond all others, were, from the nature of their construction, and from their being unprovided with telescopic sights, incompetent to detect minute alterations of sidereal positions, and knowing that the laws which governed refraction were so little understood† as to render all observations in which that element was materially involved, liable to errors greater probably than the quantities he was in search of, invented the zenith sector. It was erected at Gresham College, and consisted of a telescope, 36 feet long, a divided arc, and a plumb-line. The star selected for observation, and with reference to which, indeed, his instrument was entirely constructed, was one which passed within two or three minutes of the zenith of Gresham College; it was visible in the day-time throughout the year, and was γ *Draconis*: by observing its zenith distance when the earth was in opposite points of her orbit, he found (as he erroneously concluded) a sensible parallax, amounting to about 20 seconds, and, consequently, determined that the Copernican system was the true one‡.

"In the mean time, the eclipses of *Jupiter's* satellites, thanks to the facilities of predicting them, afforded by CASSINI's tables, had been assiduously observed; and in the year 1675, the discordances found between the predicted and the observed eclipses enabled the celebrated ROEMER to demonstrate that light was not instantaneously propagated, and that the discordances between the tables and the observations might be considered as the measure of its velocity.

"The year of ROEMER's discovery was further marked by another epoch in astronomical history, namely, the foundation of the Royal Observatory. FLAMSTEAD,

* An attempt to prove the motion of the earth from observations made by ROBERT HOOKE, F. R. S. pp. 5 and 7.

† Idem, pp. 10 and 11.

‡ Idem, p. 25.

with his mural quadrant, detected a change of place in the pole-star, amounting to 35, 40, or 45 seconds, attributed it to parallax, and regarded it as confirmatory of HOOK's discovery. Indeed, the observations of HOOK, as well as of those who preceded him, although nominally in search of parallax, had for their object little else than the confirmation or verification of the Copernican system; and this arrived at, there seems to have been but little disposition to repeat them.

"Hence it was that the brilliant discoveries of NEWTON having placed the accuracy of the Copernican system beyond all possibility of doubt, the investigation of parallax was not resumed till the latter end of November, in the year 1725, at which time MOLYNEUX erected his 24-feet zenith sector, by GRAHAM, in his observatory at Kew*. 'On the 3rd of December, γ Draconis was, for the first time, observed as it passed near the zenith, and its situation carefully taken with the instrument; and again, on the 5th, 11th, and 12th, when, no material change in the star's place having been detected, further observations seemed needless, since it was a time of the year when no sensible alteration of parallax could soon be expected.' BRADLEY, however, being on a visit to his friend MOLYNEUX, was 'tempted by curiosity to repeat the observation on the 17th, and perceived the star pass a little more southerly than when it had been observed before:' suspecting that the apparent change of place might be owing to erroneous observation, it was observed again on the 20th, and he found the star still farther south than in the preceding observations. This sensible alteration surprised himself and MOLYNEUX, in as much as it was the contrary way from which it would have been, had it proceeded from an annual parallax of the star; but being incapable of accounting for it by want of exactness in the observations, and having no notion of any other cause from which such apparent motion could proceed, they suspected that some change in the materials of the instrument itself might have occasioned it. Under this apprehension, they remained some time, but being at length fully convinced, by repeated trials, of the great exactness of the instrument, and finding, by the gradual increase of the star's distance from the pole, that there must be some regular cause which produced it, they examined nicely at the time of each observation how much it was; and about the beginning of March, 1726, the star was found to be 20'' more southerly than at the time of the first observation. It now, indeed, seemed to have arrived at its utmost limit southward; for in several observations made about this time, no sensible difference could be detected in its situation. By the middle of April, it appeared to be returning towards the north, and about the beginning of June, it passed at the same distance from the zenith as it had done in December, when it was first observed. From the quick change in the star's declination about this time (it increasing a second in three days), they concluded that it would now proceed northward, as it before had gone southward of its present situation; and it happened as was conjectured; for it continued to move northward till September following, when it again became stationary, being then near 20'' more northerly than in June, and no less than 39'' more northerly than it had been in March. From September, it returned towards the south, till it arrived, in December, at the very same situation it had been at that time twelve months, allowing for the difference of declination 'on account of the precession of the equinox.'

"Such is a brief history of the Kew observations; commenced, indeed, for the determination of sensible parallax, but which, as subsequently in the hands of HER-

* Philosophical Transactions, vol. xxxv. p. 639.

SCHEL, led to a very different result. In reading it, we are at a loss whether most to admire the mode in which the observations were conducted, or the modest unassuming manner in which they are recorded: no possible source of error is allowed to pass without the most rigid examination—no theory suffered to embarrass the observers in their observations; the slightest anomaly became the subject of suspicion, till in presumed anomaly was found the most perfect regularity.

“That observations so conducted, leading to results so unexpected, could be abandoned till the law which governed them should be unfolded, was impossible. But BRADLEY rejected all inquiries into the cause till the effects were accurately determined; and feeling that the apparent motion was obtained by observations only of one year—by one instrument—and by one star,—he erected at Wanstead, aided by his friend GRAHAM, on the 19th of August, 1727, his zenith sector of $12\frac{1}{2}$ feet focus, formed, indeed, upon the same general plan of MOLYNEUX’S, but furnished with a divided arc of $6\frac{1}{2}$ degrees on each side of the zenith point, for the purpose of enabling him to ascertain, by direct observation, whether other stars than γ *Draconis* would be similarly affected. The instrument’s situation, when adjusted, ‘might be securely depended upon to half a second,’ and its telescope could be directed to ‘not less than 12 stars, bright enough to be seen in the day-time,’ throughout the year: the same changes were observed as had been previously detected with MOLYNEUX’S instrument. Inflexible, however, in his resolution not to generalise till sufficient means were collected to lead him to a ‘probably just conclusion,’ the year of probation was suffered to be completed before ‘the observations were examined and compared:’ then it was that he satisfied himself of the general laws of the phenomena, and then, and not till then, did he endeavour to find out their cause. Convinced that the apparent motion of the stars which he had observed was not owing to nutation—persuaded, that a change in the direction of the plumb-line with which the instrument was rectified was insufficient to have occasioned it—and having appealed unsuccessfully to refraction,—he perceived, ‘that if light was propagated in time, the apparent place of a fixed object would not be the same when the eye is at rest, as when it is moving in any other direction than that of the line passing through the eye and the object; and that when the eye is moving in different directions, the apparent place of the object would be different.’ He therefore announced his discovery in these words: ‘That all the phenomena proceeded from the progressive motion of light and the earth’s annual motion in its orbit,’ or, as he afterwards called it, aberration of light.

“But he who determined its existence determined also its constant, and fixed it at $20''$; giving us, therefore, the interval of time in which light travels from the sun to the earth, as eight minutes and seven seconds, differing from that deduced by ROEMER nearly three minutes of time, a circumstance not at all to the discredit of ROEMER, considering the imperfect knowledge of the theory of *Jupiter’s* satellites at the time he made his important discovery.

“The observations, however, which led BRADLEY to the discovery of aberration, and to the determination of its constant, being as yet unpublished, have given rise to insinuations certainly ungenerous, and probably unjust. Impelled by more honourable feelings, our illustrious associate BESSEL, alluding to the observations of γ *Draconis* made by BRADLEY when the sector was removed to Greenwich, says*, ‘*Cæterum BRADLEY observationes Wansteadianæ liberari possunt à sectoris mutabilitate, quum sæpius, eodem tempore, observatæ sint stellæ, in quibus aberrationi*

* *Fundamenta Astronomiæ*, p. 124.

contraria fuerunt signa : quâ de causâ, et propter observationum præstantiam, optabile esset reperire ipsa BRADLEY autographa. It will, therefore, be highly grateful to him, and to astronomers in general, to be informed from this chair, that the manuscripts of the Wanstead observations are found!—that to the honour of the University of Oxford, twenty-three sheets of them are already printed; and that the volume will be presented to the public with as little delay as possible, under the superintendence of Professor RIGAUD.

“Till within these few years, the constant, as determined by BRADLEY, was universally employed in all our astronomical reductions; recently, however, astronomers have re-investigated it. DELAMBRE, from the eclipses of *Jupiter's* satellites regards it $20'',25$. BESSEL, from BRADLEY's Observations made at the Royal Observatory, after he was appointed Astronomer Royal, has deduced for the constant $20'',68$. LINDENAU, by comparisons of BRADLEY's, MASKELYNE's, BESSEL's, and POND's observations of *Polaris*, has obtained for it $20'',61$. BRINKLEY, from his own observations, considers it as $20'',37$. Whilst STRUVE, by his observations, draws almost the same inference, namely $20'',35$.

“Such were the results most entitled to our confidence, when Mr. RICHARDSON, in the hours allotted to him for repose or recreation, undertook those labours which form the subject of our present consideration, and of which the following is a brief outline. A second mural circle by JONES, after the model of that of TROUGHTON's, having been erected at the Royal Observatory, in the April of 1825, corresponding observations with the two instruments were carried on simultaneously; they were confined, indeed to a few stars, but every precaution to render them as accurate as possible was adopted. Thus, the index error of each instrument was ascertained by observing the same star alternately, by direct vision and reflection; each pair, therefore, giving to its respective instrument one horizontal point perfectly independent of astronomical tables, the final accuracy of the determination of the index error being directly as the number of pairs observed. Throughout the observations, the place of each star was arrived at by reference to the six microscopes of each circle; care also being taken to equalise, as nearly as possible, the temperature of the observatory with that of the external air, so that errors to any extent, arising from partial expansions or erroneous divisions of the instrument, were effectually excluded.

“From such unexceptionable data, fourteen stars were selected by Mr. RICHARDSON as the fittest for his purpose, being those the least affected by refraction, and the most affected by aberration, so that the errors of observation might have the minimum influence upon the results. Upwards of 4000 observations he separately discussed, and in no instance was the actual aberration of each observed star less than $14''$; and the conclusion to which he has arrived is, from TROUGHTON's circle, that the Constant of Aberration is $20'',505$; whilst by JONES's, it is $20'',502$, the one differing from the other but three-thousandths of a second.

“Hook, in searching for parallax, was misled by his instrument. BRADLEY, in detecting it was unsuccessful, but discovered aberration. HOOK's instrument was the work of his own hands; BRADLEY's was the work of GRAHAM. Sensible that much of his astronomical glory was referable to the accuracy of his instrument, the amateur astronomer of Wanstead was ever ready to acknowledge it; and when we consider that one hundred years' improvement in astronomical manipulations can alter the constant of aberration as determined by him but one half second, we are almost led to exclaim ‘*quando ullum inveniemus parem?*’

“OUR GRAHAM is amongst us ; to him we are indebted for the instruments with which results thus important have been obtained, and also for the mode of using them, through which the maximum of accuracy has been acquired. One of them, was made with his own hands, the other under his direction ; and it is not too much to say, that the disciple has shewn himself worthy of his master. The benefits which ENWARD TROUGHTON has conferred on science are too well known to need enumeration. His Majesty the King of Denmark, not insensible to the importance of science, and feeling that for much of the accuracy to which astronomy and navigation have arrived, we are indebted to the genius of our revered member, has recently acknowledged his gratitude to him, by the presentation of his gold medal, inscribed with the word ‘MERITO.’ Never was inscription more appropriate. May he live long to enjoy this token of respect ! alike honourable to himself and to the princely feelings of its royal donor.

“On looking over the constant as determined by each star, nothing definitive, as Mr. RICHARDSON justly observes, can be concluded, as to whether light emitted from different stars is propagated to us with different degrees of velocity : the idea is not irrational, but its validity future astronomers must determine.”

Before concluding our imperfect sketch of what have been the labours of astronomers in Europe, we must not overlook the works of our countrymen in the East. The Madras Observatory has been newly modelled, it is true ; but in its olden state, under the indefatigable GOLINGHAM, it was turned to the best purpose, as is proved by the creditable volumes published from time to time under great disadvantage from the want of a good printing establishment. A volume of the observations in 1831 is just announced to the public, and we know that they have been reduced and arranged with great care by Mr. TAYLOR, who, although now commencing a new career with more powerful and perfect means at his command, knows how to appreciate the talents and care of his able predecessor.

Among the deaths of eminent astronomers noticed at the last annual meeting were those of the Rev. F. FALLOWS, late astronomer at the Cape of Good Hope ; Capt. FOSTER, R. N. ;—M. PONS of Marlia, and the ABBE GREGOIRE. Mr. FALLOWS was appointed to the Cape early in 1821, and he reached it in the 12th August.

“His first undertaking was an approximate catalogue of 275 principal stars, published in the Phil. Trans. 1824. From the description of the instruments employed, it will be seen, that they were of a very humble description, viz. a portable transit of only twenty inches focal length, and a very indifferent altitude and azimuth instrument by Ramsden, ill divided, and unstable in its adjustments, being indeed originally constructed as an equatorial. It is probable that the length of time which must necessarily elapse between the design and completion of a first-rate observatory, in a foreign station, was not fully taken in to account, either by the Government or the astronomer, otherwise the temporary instruments would, doubtless have been of a very different class. The plan of the observatory was received by Mr. FALLOWS in the latter part of 1825, and he immediately proceeded to carry it into effect. A site was selected about three miles from Cape Town, and Mr. FALLOWS lived in a tent on the spot, to determine the lines of the building and to superintend the workmen. The foundations were dug out before the clerk of the works arrived to relieve him from this task.

“In the beginning of 1829, the transit and mural circle were fixed in their places, and we might now have anticipated a season of enjoyment for the Cape astronomer, but for some cause hitherto unexplained, the circle to which he had looked forward with pride and exultation proved for a long time a source of bitter uneasiness. Some

part of this must doubtless be attributed to the shattered state of the observer's health ; but the fact, that ' the index error of two opposite microscopes was ever variable in different parts of the instrument, while with three microscopes, at 120° distance from each other, or with the whole six, the index error was nearly constant,' was sufficiently startling to harass a person of less sanguine and zealous temper. Finally, Mr. FALLOWS was of opinion, that some permanent injury had been received by the circle and axis, from a fall which the package received whilst it was removing from the hold of the ship at the time of landing, but that the mean of the six microscopes might be fully depended upon, since high and low stars, when observed directly and by reflexion, gave the same position of the horizontal point. Before he had come to this conclusion, which seems to have been some time in the middle of 1830, sickness deprived him of the services of his assistant, Capt. RONALD, and Mr. FALLOWS was left, unaided, to do the best he might with a transit and mural circle. He was relieved from this difficulty by the affection and intelligence of Mrs. FALLOWS, who offered to undertake the circle observations while he was engaged with the transit, a very little instruction sufficed to render her perfectly competent for this task : and the Cape astronomer had like HEVELIUS, the pleasure of finding his best assistant in the partner of his affections. Some of his letters, written at this time, express a strong hope and confidence that he should at length be able to justify the high expectations which had been formed of the observatory, and that his work would bear a comparison in accuracy, though not in extent, with that of any other establishment.

" But the labours of the observatory were too much for a constitution already much enfeebled by previous illness. He had suffered very severely from a *coup de soleil*, soon after his arrival at the Cape, while fixing the small transit ; and besides some less serious complaints, experienced a dangerous attack of scarlet fever in the summer of 1830, from which he seems never to have fully recovered. In the beginning of 1831, his health was visibly impaired, but he could not be induced to leave the observatory before the equinox. Towards the end of March, he became incapable of struggling any longer with the disease, and went to Simon's Town : but it was now too late, and he breathed his last on the 25th July, 1831, in the forty-third year of his age."

Mr. T. HENDERSON, well known as one of the most active and enlightened cultivators of astronomy, has been appointed to succeed Mr. FALLOWS, with Mr. MEADOWS, as his assistant.

Captain FOSTER (known as the companion of Capt. PARRY in his voyage to the north pole) was unfortunately drowned while descending the River Chagres, in a canoe, towards his ship the Chanticleer, then lying at anchor. He had nearly completed his experimental voyage, the object of which was to swing Kater's convertible pendulum near the equator, and in various places in the southern hemisphere. He had performed this task at fourteen different places, and had amassed a series of 1017 observations, arranged with such system in printed registers that there will be little difficulty in digesting the results.

M. PONS belonged to the observatory of Marseilles, where he became known from his steady attention to the discovery of comets : indeed in the beginning of his career he was put at the head of an observatory at Lucca by Maria Louisa of Bourbon, with provision that he should receive 100 dollars from the Queen's purse for every comet he might discover !

Meteorological Observations made at the Assay Office, Calcutta, for the month of January, 1833.

Day of the month.	Barometer reduced to 32° Fahr.				Temperature of the Air in an open Veranda.				Depression of the moist-bulb Thermometer.				Hair Hygrometer.		Wind.		Rain.	Weather.	
	At 5 A.M.	At 10 A.M.	At 4 P. M.	At 10½ P.M.	Minimum 5 A.M.	At 10 A.M.	Register- red max.	At 4 P. M.	At 10½ P.M.	At 5 A. M.	At 10 A. M.	At 4 P. M.	At 10½ P.M.	Morning.	Noon.	Evening.		Morning.	Noon.
1	30.151	.221	.100	.173	54.0	60.4	75.5	65.2	58.2	7.0	9.5	11.7	11.2	86	n.	n. w.		clear.	clear.
2	.121	.191	.042	.130	50.0	60.4	75.5	65.2	59.9	4.0	9.2	10.7	11.2	80	do.	n. w.		ditto.	ditto.
3	.045	.138	.035	.063	62.8	62.8	76.2	65.5	61.0	4.2	8.2	9.8	9.8	83	n. e.	w.		cist.	ditto.
4	.021	.111	.000	.063	53.0	64.0	80.7	69.0	64.5	4.2	8.2	11.4	5.9	83	n. e.	cm.		ditto.	ditto.
5	.016	.119	.021	.117	57.0	65.5	81.4	70.4	65.5	3.3	7.2	9.6	7.8	82	cm.	n. e.		ditto.	ditto.
6	.108	.125	.050	.130	60.3	66.0	80.2	73.0	69.2	5.3	6.5	9.6	6.9	80	n. e.	do.		fog.	ditto.
7	.101	.152	.066	.087	62.5	67.7	86.2	75.0	68.4	3.5	5.9	9.6	7.8	81	cm.	s. w.		ditto.	ditto.
8	.026	.097	.072	.028	64.4	69.7	85.7	73.1	70.4	4.7	5.1	11.5	9.9	89	n. e.	do.		ditto.	ditto.
9	.024	.111	.093	.042	64.1	68.3	86.7	73.2	66.4	1.4	7.0	12.5	8.9	88	w.	n. w.		ditto.	ditto.
10	.044	.120	.093	.061	60.0	66.2	85.5	72.9	67.8	8.9	7.1	13.2	11.3	85	do.	n.		ditto.	cist.
11	.016	.057	.036	.061	60.0	68.2	85.5	72.9	67.8	5.0	7.6	11.8	10.4	87	cm.	n. w.		ditto.	clear.
12	.035	.097	.051	.031	61.4	67.7	86.8	74.6	68.2	2.6	7.7	12.6	10.4	88	n.	w.		ditto.	clear.
13	.084	.065	.080	.067	63.3	68.2	86.7	74.5	67.2	11.1	7.5	12.4	9.1	88	s. e.	do.		fog.	ditto.
14	.084	.093	.084	.079	65.7	70.3	85.2	74.5	65.2	11.9	7.3	12.2	6.9	88	s. e.	n. w.		clear.	ditto.
15	.083	.051	.044	.018	65.2	71.8	84.7	73.8	69.0	9.4	11.3	11.2	8.0	80	n. e.	n.		clear.	ditto.
16	.083	.010	.035	.017	60.0	70.6	83.5	74.8	67.1	6.5	9.4	13.1	6.4	82	n.	s. w.		ditto.	ditto.
17	.083	.065	.089	.032	63.2	70.6	82.0	74.8	70.0	3.1	7.3	10.8	7.4	88	s. e.	e.	0.05	nimbus.	nimbus.
18	.032	.079	.027	.042	63.0	71.0	81.1	70.0	68.0	3.5	7.7	8.2	7.8	88	n. e.	n.		clear.	clear.
19	.025	.095	.095	.062	62.2	68.0	80.2	71.3	66.5	4.0	6.4	12.9	5.4	91	n. w.	n. w.		ditto.	ditto.
20	.078	.135	.033	.102	61.8	67.3	80.8	71.0	66.1	4.6	8.4	12.3	8.6	85	n. e.	do.		ditto.	ditto.
21	.084	.147	.053	.109	61.0	66.8	79.7	70.4	65.2	5.0	13.8	12.0	5.1	77	cm.	n. e.		ditto.	ditto.
22	.062	.128	.089	.088	60.8	66.2	78.5	71.4	63.4	2.8	9.4	13.4	2.3	82	n.	do.		ditto.	ditto.
23	.066	.128	.030	.116	64.4	66.8	78.2	72.0	64.7	6.2	10.0	11.6	7.7	81	cm.	do.		ditto.	ditto.
24	.119	.140	.053	.130	58.0	68.7	79.1	71.2	64.0	5.0	9.1	10.4	7.3	84	n. e.	n. e.		ditto.	ditto.
25	.154	.150	.036	.108	62.5	69.8	78.8	74.2	68.0	9.3	10.2	11.7	7.5	83	do.	s. e.		ditto.	ditto.
26	.089	.120	.028	.136	64.0	66.5	78.5	74.0	67.2	6.4	9.7	11.5	4.2	83	do.	s.		stratus.	clear.
27	.106	.100	.068	.118	60.8	68.3	73.2	73.9	68.7	6.7	9.3	11.7	11.7	84	n. w.	w.		clear.	nimbus.
28	.085	.130	.007	.115	63.0	68.2	79.5	73.8	68.2	5.4	8.9	11.8	7.2	85	cm.	n.		clear.	cl.
29	.095	.130	.019	.123	64.2	69.8	81.6	74.3	66.2	9.2	8.7	12.1	10.0	79	cm.	n. w.		ditto.	ditto.
30	.050	.097	.042	.089	63.5	68.3	80.8	74.8	66.3	7.1	9.1	12.4	5.5	84	n.	do.		ditto.	ditto.
31	.084	.030	.011	.020	64.2	70.9	81.3	76.8	68.8	5.6	9.1	12.1	7.5	88	do.	do.		ditto.	cist.
Means	30.036	.095	.079	.056	61.1	68.0	81.3	72.4	66.4	5.8	8.4	11.6	7.7	85	northerly.		0.05	fine clear dry weather.	

Note.—As the Meteorological Register kept at the Surveyor General's Office is now issued without the corrections for the temperature of the Mercury, &c. it has been found convenient to substitute the Table of Observations made at the Assay Office, and to alter the form so as to shew the ranges of pressure, temperature, and moisture more compactly. The Barometer stands 0.020 lower than the instrument at the Surveyor General's.

NOTE.—As the Meteorological Register kept at the Surveyor General's Office is now issued without the corrections for the temperature of the Mercury, &c. it has been found convenient to substitute the Table of Observations made at the Assay Office, and to alter the form so as to shew the ranges of pressure, temperature, and moisture more compactly. The Barometer stands 0.020 lower than the instrument at the Surveyor General's.

